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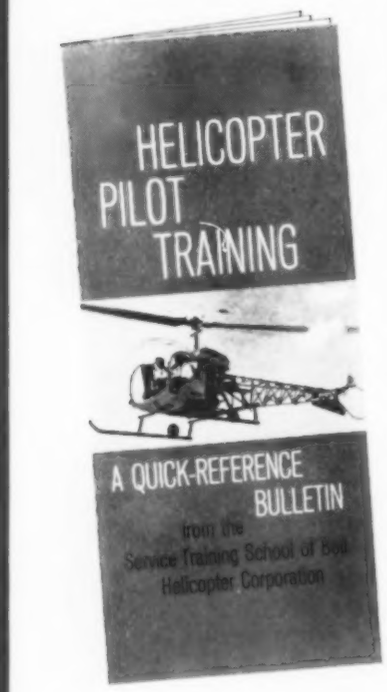

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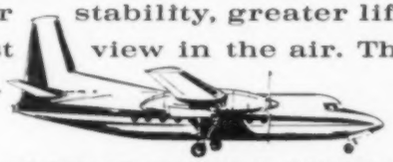

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FLIGHT MAGAZINE

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ALASKA, HERE WE COME! So said these pretty pilots when they picked up a new Beechcraft Travel Air Twin at the factory last month and flew it 3,000 miles to Fairbanks for delivery to Interior Airways there. With Mrs. Jim Magoffin, right, wife of the owner of Interior Airways, was Mrs. Stephen Henry. Interior Airways operates several Beech Model 18 Twins, a Twin-Bonanza, a Bonanza and numerous larger aircraft.

AIR Report
Significant Trends and News

HIGHEST SPEEDS YET ATTAINED BY LIGHT TWINS are listed for new 1960 Aero Commanders announced last month. Four new Commanders are topped by Model 680F with a 290-mph. top speed and 244-mph. cruise speed, the latter for 70% hp. at 10,000 ft. and at a record high gross weight of 8,000 lbs. and useful load of a hefty 3,200 lbs. Single-engine service ceiling is 16,100 ft. It is powered by new Lycoming IGSO-540 fuel-injected, geared and supercharged 6-cylinder engines rated at 380 hp. each for take-off and 360 hp. METO. For the record high speeds, all four new Commanders have higher new red-line speed of 288 mph. and yellow-line speed of 230 mph. IAS, as compared to previous 270 and 210-mph. airspeed indicator markings. For details of new Commanders, see page 20.

SIMMONDS FUEL INJECTION FOR PRATT & WHITNEY R-985 ENGINE is now available from Conrad Aircraft Manufacturing Corp., Ft. Lauderdale, Florida. Complete FAA-approved installation for both engines on Beech Twin costs $5,100 for kits plus $550 for installation at Conrad. Bill Conrad says Simmonds SU-580 system, with automatic mixture control, assures correct fuel-air ratio at all times, controls fuel consumption with accuracy of 1/10 of a pound, makes for improved engine smoothness through better fuel distribution, saves 15% or more fuel in cruising, eliminates carburetor icing and boosts engine's critical 450-hp. ceiling to 4,500 ft. for higher cruise ceilings. Installation package and cost include automatic by-pass oil radiators, Winslow 10-micron filters, scoops, fairings, hardware and supplement for flight manual.

TWELFTH ANNUAL BEECHCRAFT SERVICE CLINIC began in April and will continue until October, with 14 Beech factory service technicians touring 40 different locations throughout the U. S. at which owners of Beech airplanes will be urged to take advantage of free maintenance checks. The factory check-ups are sponsored by Beech and its distributor-sales and service organization as a service to owners, over 100 items being checked on six Beech models. Owner of the "best maintained" Beechcraft in each territory will receive a special certificate of award. First in-

FLIGHT MAGAZINE

APRIL, 1960 VOL. 49, No. 4

THIS MONTH'S COVER pictures the new high-performance Piper Aztec light twin, powered by two 250-hp. Lycoming O-540 engines and boasting a cruising speed of 205 mph. on 75% hp. at 7,000 ft., 144-gal. fuel supply for 1,400-mile range and 2,025-lb. useful load at a gross weight of 4,800 lbs.

—(Piper Photo by Tony Linck.)

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Small-Town Market Penetration—BY GEORGE E. HADDAWAY—COLORADO CESSNA DISTRIBUTOR STAGES WEEKEND AIRPLANE SHOWS TO STIMULATE INTEREST 54

New Business in the Hangar—NATIONWIDE ROUNDUP OF INTERESTING DEVELOPMENTS IN BUSINESS FLYING 62

GEORGE E. HADDAWAY, Editor-Publisher; TOM ASHLEY, Managing Editor; FRED N. STONES JR., Business Manager; LOUISE ROBERTSON, Circulation; E. H. PICKERING, Consultant; P. O. Box 750 (2700 N. Haskell Ave.), Dallas, Texas — Telephone TAylor 3-6191.

FLIGHT MAGAZINE, April, 1960, Vol. 49, No. 4. Published Monthly. Publication Office, P. O. Box 750 (2700 N. Haskell Ave.), Dallas, Texas. Price 50c single copy. Subscription rates: United States, one year, $3.00; two years, $5.00; three years, $6.00. Established February, 1934. Entered as second-class matter at the Post Office, Dallas, under the act of March 3, 1879.

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Wiggins 'copter sprays cranberry bog, one of several helicopter operations Wiggins pioneered.

Hustle-Bustle

A behind-scenes report on "New England's most versatile airways" —Wiggins Airways, of Norwood, Mass.

by **HERB FISHER**

International aviation authority, veteran test pilot, author

"Our evaluation tests on this new *Foul-Resistant* plug indicate Champion is about 10 years ahead in plug development," Wiggins President Joseph Garside (2nd from left) tells (l/r) Tom Alegretti, Champion; E. W. Wiggins, Jr., Wiggins Vice-Pres.; Herb Fisher; and Fred Valentine, Service Mgr.

Wiggins' flight, sales and manufacturing activities are concentrated here at Norwood Airport. Of some 4,500 to 5,000 landings per month, about 100 a week are visiting business aircraft.

Max Conrad, world-record-holding "Flying Grandaddy," chats with Tom Alegretti and Fred Valentine, prior to ferrying Piper Apache to Finland.

Wiggins Airways in Norwood, Mass., is a hustle-bustle outfit of diverse character and versatile personality. You're not there long before you get caught up in the spirit of things. The people like their work—their enthusiasm is reflected in a prideful perfectionism—and their customers obviously like their work, too.

Wiggins has a 30-year history of grass-roots aviation experience that's about as comprehensive and varied as any I've ever run across. Primarily, the company is sales-service-modification center for both domestic and overseas business-type aircraft. But the backstage romance of Wiggins Airways lies in its versatility:

In a modern new hangar, skilled craftsmen fit light aircraft with special electronic gear and fuel tanks for ferry delivery to Europe, Africa, South America. Customers have included foreign governments, big industry and royalty —among the latter, King Hussein of Jordan, who had two twin Beech Bonanzas outfitted at Wiggins.

In adjacent new hangars, other technicians do complete exterior-interior conversion jobs . . . maintain and overhaul all aircraft for Provincetown-Boston Airlines . . . do complete servicing on scores of business and private aircraft.

Elsewhere at Wiggins' Norwood Airport facility, student pilots take pre-flight in link trainers or solo aloft. Wiggins' flight instruction provides for training all the way up to an airline pilot rating.

In Greater Boston's only aviation showroom—Wiggins—businessmen look over new Piper Twin Apaches, Comanches and Tri-Pacers. Wiggins handles all Piper sales in southern New England—sells reconditioned and converted used aircraft as well—and maintains an aviation stockroom with a complete inventory of aircraft parts, accessories, supplies. Wiggins is the main parts-and-equipment depot for the New England states.

(Advertisement)

Outfit

Wiggins does complete maintenance and overhaul for Provincetown-Boston Airline fleet. Here Fred Valentine and Tom Alegretti (l/r) check installation of Champion's new *All-Weather* Foul-Resistant spark plugs, which alleviate the New England moisture problem.

Meanwhile, "back on the farm," Bell helicopters spray New England apple orchards . . . treat forests and kill brush . . . fly powerline patrol . . . crop-dust . . . shuttle personnel and equipment. Wiggins pioneered many of these helicopter operations; in the past 12 years, Wiggins 'copters have become increasingly valuable to New England agriculture and industry, saving millions in time, money and manpower.

Wiggins "air-taxi" planes take businessmen, VIP's or vacationers on time-saving flights through the six New England states and beyond. *An unusual feature of this "air-taxi" service is the opportunity for passengers to get free flying instruction while en route to and from their destinations.* (Quite a few air-minded passengers have picked up their pilot licenses almost "automatically" this way.)

Probably most unusual of all Wiggins' diversified operations, however, is its research-experimentation-manufacturing facility at Norwood Airport. A lot of this, surprisingly, is in no way connected with the aviation industry—though a considerable portion is.

Wiggins' machine shop work includes such ambitious undertakings as development and prototype engineering of components for atomic submarines, missiles and experimental aircraft. Wiggins has built everything from little automatic dispensers for private industry to complete military aircraft of entirely new design—such as a complete STOL for Fairchild. Wiggins once built a 40-foot collapsible bridge for the Army, an aluminum bridge capable of supporting an 80-ton tank; the bridge can be folded up and tucked into the belly of a transport plane. The military looks to Wiggins for such other services as magnafluxing of vital components of atomic subs.

In this advanced research and experimentation phase, Wiggins was among the first to give full field evaluation tests to Champion Spark Plug Company's new Foul-Resistant plugs—much in demand since Max Conrad lifted eyebrows by flying solo from Casablanca to Los Angeles, for a non-stop world record, *without plug fouling*. Wiggins subjected the REM40E Foul-Resistant plugs to 200-hour comparative tests with other plug types, utilizing both Tri-Pacer and Apache aircraft. The All-Weather version of the new Foul-Resistant plug was included in these tests.

"From the results of our evaluation tests," said Wiggins President Joseph Garside, "*I'd say those self-cleaning Foul-Resistant plugs put Champion about 10 years ahead in plug development!* The two-prong electrodes, bigger bores and longer core noses enabled combustion gases to keep the firing ends blasted clean, whereas other plugs in the tests showed heavy lead and carbon fouling deposits.

"We're phasing-out all other plugs in our own fleet, Herb, re-equipping both fixed-wing aircraft and helicopters with Foul-Resistant plugs.

"Customer demand for the new plug is terrific, now, too."

The All-Weather version of the new Foul-Resistant plug has special significance in New England, Service Manager Fred Valentine told me, "because moisture is the big ignition problem here. The All-Weather plug practically eliminates this major headache." (Having flown just about every type of aircraft under the conditions Fred speaks of, I know well what he means.)

Prior to 1956, Wiggins' operation was scattered. Now, nearly all manufacturing, sales, airplane servicing and overhaul and flight activities are consolidated in these modern facilities at Norwood Airport. The company also leases hangar, office and ramp facilities at Logan International Airport, Boston, for contract fueling, storage and servicing of large aircraft—both scheduled and non-scheduled airlines and itinerant aircraft.

Keep an eye on this hustle-bustle outfit—have your plane serviced there next time you're around Boston.

CHAMPION SPARK PLUG COMPANY
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Wiggins' first aircraft, a Spartan with a Wright J6-7 engine, bought in 1929. It was equipped with Champion "Aero" Spark Plugs, one of the world's first successful ceramic plugs.

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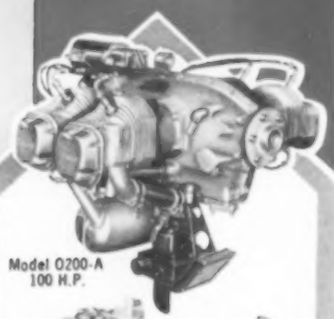
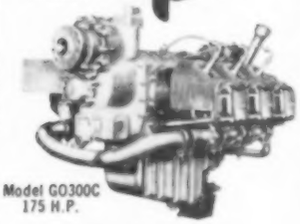
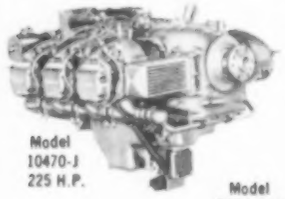
CONTINENTAL AIRCRAFT ENGINES



Model O200-A
100 H.P.

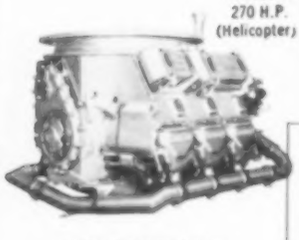


Model GO300C
175 H.P.



Model
IO470-J
225 H.P.

Model
FSO526-A
270 H.P.
(Helicopter)



20 MODELS 65 TO 340 HORSEPOWER

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MODEL	HP	RPM	CYL.	WT.	OCTANE
A65	65	2300	4	173	80/87
C90	95	2625	4	207	80/87
O200-A	100	2750	4	190	80/87
O300-A B & C	145	2700	6	277	80/87
GO300-C	175	3200	6	312	80/87
E225	225	2650	6	363	80/87
O470-K & L	230	2600	6	404	80/87
O470-M	240	2600	6	409	91/96
O470-G	240	2600	6	432	91/96
O470-H*	240	2600	6	472	91/96
IO470-C	250	2600	6	432	91/96
IO470-D	260	2625	6	426	100/115
IO470-F	260	2625	6	426	100/130
IO470-J	225	2600	6	402	80/87
IO470-K	225	2600	6	391	100/130
FSO526-A**	270	3200	6	575	91/96
GSO526-A	340	3100	6	549	91/96

*Pusher Type engine with extended propeller shaft
**Helicopter engine

Continental Motors Corporation
AIRCRAFT ENGINE DIVISION
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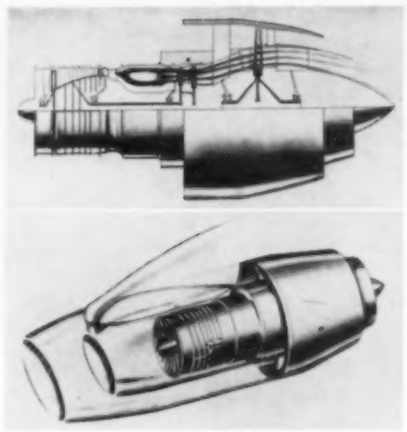

NEW GENERAL ELECTRIC AFT-FAN JET, the 4,000-lb.-thrust CF700-1, is sketched above to illustrate air flow and aft-fan placement (top) and pod installation (lower sketch) with fan intake at left being forward of combustion air intake. Essentially a J85 turbojet to which an aft-fan has been added, it weighs 585 lbs., has 33-in. maximum diameter, has 0.69 specific fuel consumption and gives more thrust, better take-off and climb, 20% more range and superior hot-day performance than the same engine without the fan.

spections began April 5 at Houston. Over 1,500 Beechcrafts were analyzed in last year's clinic tour.

NEWEST PURCHASER OF LOCKHEED JETSTAR is Hercules Powder Co., Wilmington, Delaware, with delivery scheduled for May, 1961. The 10-place, 550-mph. Jetstar will fly from Wilmington to a company plant at Lake Charles, Louisiana, in 2 hours as compared to 7 hours now required in propeller-driven Hercules planes, and from Wilmington to Salt Lake City in 4 hours. Thus 2-day trips out and back will be made in a single working day, with less time in the air and away from home base.

U. S. AIR FORCE IS ACCEPTING APPLICATIONS FOR CIVILIAN AIRPLANE PILOTS, the positions being in the Federal Civil Service with basic starting salaries of $7,030 and $8,330 annually. Acceptance of one of the airplane pilot positions requires the civilian to join the Air Force reserve, with additional pay as a reservist amounting to about $1,600 annually. Continental Air Command calls this new civilian-reservist employe an "Air Reserve Technician." Information may be obtained from nearest post office, state employment office, Civil Service offices and most Air Force installations.

AIRCRAFT RADIO CORPORATION, Boonton, N. J., has promoted S. A. Meacham to be manager of the commercial sales department succeeding H. S. (Chris) Christensen, longtime and widely-known ARC commer-

(Continued on page 61)

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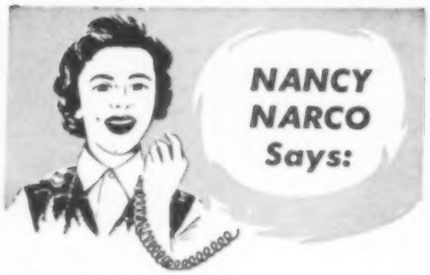

PIREPS

Ever ponder carefully all the weather information the best weather guessers could give you, then wish you had a reading for a point or critical area the teletype just doesn't cover? Or need a cloud-top report in the worst way only to find the Weather Bureau doesn't have any station up there? In short, have you ever wished there was some system that would let you, on the ground planning a flight, know what the en route weather is actually like from pilots who have been there?

Well, it looks like FAA has taken a big step forward to make this kind of en route weather information available in a big way. They have instituted a whole new program to gather and disseminate en route weather reports from pilots — PIREPS as they are familiarly known.

Whereas in the past PIREPS have been accepted and passed on as they came in, FAA communications stations are now directed to solicit actively all significant en route weather reports.

Under the new system, FAA requests pilots to report not only severe weather conditions such as thunderstorms, icing, and turbulence, but also routine information such as cloud-tops and bases, intermediate and higher layers. Whenever there is thunderstorm activity within 100 miles of an FAA station or whenever the ceilings are less than 10,000 feet, FAA Flight Service Stations (FSS) — the newly adopted term for ATCS stations — have been instructed to ask for reports from pilots in the area — so don't be surprised if you're asked to be a flying weather bureau.

PIREPS summaries are now being included in all scheduled and transcribed broadcasts and individual PIREPS which report urgent conditions will be broadcast immediately. PIREPS go on the teletype hourly starting at 10 minutes after the hour, and if there's any doubt about the weather on your route you should make it a practice to check these reports. In addition, each FAA Flight Service Station will post PIREPS information on their wall-mounted air maps at the point on the map where a pilot report is made.

This new emphasis on PIREPS should be a great boon for all pilots, whether flying IFR or VFR, but the full effectiveness of it cannot be realized unless all pilots flying cross-country cooperate by making reports. For the VFR pilot, information on conditions in mountain passes, obscuration of ridges and en route visibility reports will be of particular interest. For the IFR pilot, information on cloud-tops, icing, intermediate layers, build-ups, and other on-top conditions will be invaluable.

This new program should mark a very important advance toward getting a more complete picture of the weather. Let's make sure we all do our share in passing on significant weather information.

Regards,

Nancy

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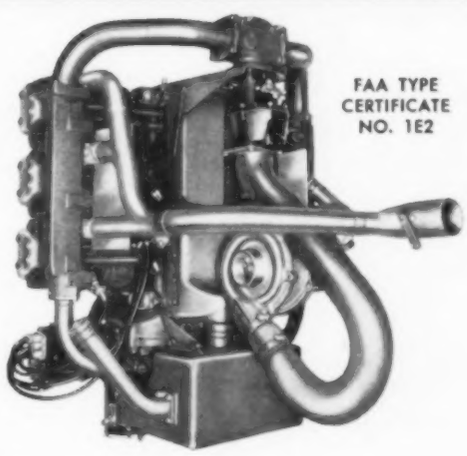
- Carry to 20,000 feet altitude and land a useful load of 1,000 lbs.

Throughout the two-week altitude test program, neither maintenance nor repairs (not even a spark plug change) were performed on the Franklin 6VS-335 turbocharged engine.



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1st with Jets

Just among ourselves

Who Represents General Aviation?

CIVIL aviation interests will always require protection from the ever-present danger of bureaucratic, impersonal and over-bearing big government.

It matters little who sits at the top of our Federal aviation agencies — they are here today, gone tomorrow. But it does matter how the forces of civil aviation go about the business of self-protection from big government and the constant threat of misguided thinking in making the rules we operate under.

This holds true for general aviation and for the airlines. The airlines are well organized into the Air Transport Association. The individual airlines fight like cats and dogs among themselves for routes and special privileges. They differ widely in many basic concepts of airline operation. But they stick together when it comes to dealing with the government — local, state or Federal.

Since the end of World War II, the forces of general aviation have done a pretty good job of solid front representation at the national level. The Congress of National Aviation Organizations in the late 1940's, the civil aviation task force under the National Securities Resources Board during the Korean conflict, the General Aviation Facilities Planning Group and more recently, the General Aviation Council, which grew out of the planning group — all have done a splendid job in dealing with the Federal government in all sorts of matters. Most significant is the fact that every facet of general aviation has always been represented in these organizations.

The General Aviation Council, until last month, was composed of eleven national organizations. At the February meeting of the Council in Washington, FAA Administrator E. R. Quesada stated unequivocally that "The General Aviation Council is the true and proper representative of general aviation . . . it is my desire to work with this group and to look to it for future guidance."

Shortly after this forthright statement, the General Aviation Council met again and revised its method of operation to permit the GAC to make public policy statements with the approval of two-thirds of its member organizations. Prior to this rule revision, the GAC could act only when there was unanimous agreement on any proposed action. As a result of this change in procedure the Aircraft Owners and Pilots Association resigned — the first major rift in general aviation ranks since the original postwar efforts to work together.

It would be a bit ridiculous for us to second-guess the AOPA in figuring out why they resigned but it should be pointed out that the recent feud between AOPA and Mr. Quesada and Mr. Quesada's statement that the General Aviation Council should be the spokesman for general aviation interests probably were involved in the AOPA action. It looks as if AOPA wants to be the single spokesman for general aviation interests and with the "unanimous rule" abandoned by the GAC, a majority vote of the GAC members might cut into the AOPA power, policies or politics. These factors can not be ignored.

We believe the AOPA has weakened itself more than it has weakened the GAC. As a privately-owned, profit-making organization whose members have no vote or can't elect officers, the AOPA will have a tough time outside the General Aviation Council insofar as claiming effective representation when the Federal Aviation Agency head says he's going to work through the GAC. There are four pilot organizations still within the GAC — the Flying Farmers, the Flying Physicians, the National Pilots Association and the Soaring Society of America — all democratically run, non-profit organizations. With them are the fixed-base operator interests through the National Aviation Trades Association and the Aeronautical Training Society; the aircraft manufacturers in the Utility Aircraft Council of the AIA; the distributors and manufacturers of aeronautical products in the Aviation Distributors and Manufacturers Association; the state officials through the National Association of State Aviation Officials; the corporate aircraft owners through the National Business Aircraft Association. These basic groups should and probably will stick together for general aviation's solid front in the GAC. By leaving the GAC, the AOPA reveals its true nature — it must sustain itself by telling the government how to run its business without majority opinion from other organizations within the general aviation family. As a commercial, profit-making enterprise it apparently cannot afford to give up any of its jealously-guarded, self-assumed roles as "saviour" and chief champion of its members.

Blunder Over Cuban Trade

THE ebb and flow of U. S. diplomatic relations with the Castro regime in Cuba deeply involve aircraft. The most recent incident was the shooting down of an American lightplane which the Cubans claim was being employed to evacuate former Batista followers. A few weeks earlier the State Department withdrew export licenses for several helicopter purchases which originally had been approved. When the pilots from Cuba came to pick up the machines they were told that only their spare parts order could be filled.

In the case of U. S. lightplanes operating in Cuba, we feel that U. S. citizens are foolhardy to go on expeditions to the island republic for any purpose, and any pilot so stupid as to get involved in such goings-on certainly is asking for trouble. A few more shootings should put an end to silly aerial excursions on the part of American pilots, precluding any need on the part of the U. S. government to patrol the channel between Florida and Cuba.

Perhaps the State Department has good reason for cancelling the export

licenses for a handful of helicopters. But we wonder if the reasons are good enough to stand up under the strong light of sensible and realistic foreign relations? Both Castro headquarters and the pilots who came to pick up the helicopters announced that the turn-down means Cuba will go to the Soviet Union for future helicopter orders. Our old friend, Capt. Montenegro, who came here on the purchasing commission, told us that once they started buying from the Russians it would probably be the end of U. S. orders because of liberal credit arrangements offered by the Soviet — 12 years to pay at two per cent interest.

If the refusal by the State Department to permit the sale of helicopters or lightplanes to the Cuban Government is the beginning of all-out pressure against Castro as a new and vigorous U. S. Government policy, then protest might be out of order. But if the net result of denying the Cubans a few more of our helicopters (they have a dozen or so now) is going to result in simply creating a vacuum at our doorsteps to be filled by Russian flying machines with the well-known Russian "technical" crews that always accompany Soviet products, our State Department is guilty of the stupid blunder it now appears to be.

The denial of a few helicopters is not going to hurt Cuba because they can get them elsewhere, and will. The only way to seriously cripple Castro is to pull the rug from under our sugar subsidy. As it stands now it seems that the U. S. State Department is straining at gnats and swallowing camels, and in the process is paving the way for Soviet infiltration of our Western Hemisphere markets.

DWANE L. WALLACE, president of Cessna Aircraft Co., has received the 1960 Guideposts Magazine Award "for distinguished service to the nation through support of spiritual principles as the basis of American freedom." Presented by Dr. Norman Vincent Peale, the award goes periodically to outstanding business leaders who follow Christian principles.

OVER 500 TWIN-JET T-37 TRAINERS FOR THE U. S. AIR FORCE have been produced by Cessna Aircraft Company at Wichita, the 500th unit being in this group on the production line. Latest version is the T-37B and current contracts call for production into mid-1961. The 400-mph, side-by-side Cessna jets are in use at schools turning out Air Force pilots in Georgia, Florida and Texas and hundreds of pilots received their first jet training in them. —(Cessna Photo.)

Airmen's Calendar

April 14-24—Los Angeles International Air and Space Exposition, L. A. Sports Arena.

April 20-22 — Aircraft Electronics Association's Annual Meeting, Hotel Sir Francis Drake, San Francisco.

April 24-May 3—German Aviation Show and Industrial Fair, Hanover, Germany.

May 11-14—16th Annual National Forum, American Helicopter Society, Sheraton Park Hotel, Washington, D. C., with Trade Exhibit and Air Show. Address Inquiries to Harry M. Lounsbury, Exec. Scty., 2 East 64th St., New York 21, N. Y.

May 12-14—12th Annual Contests, National Intercollegiate Flying Association, Ohio State University Airport, Columbus.

May 13—Fort Worth to Houston Air Race for Female Pilots, sponsored by Fort Worth Women Pilots; entry deadline May 5; Fee 5; contact Miss Delphine Bohn, Box 4037, Ft. Worth.

May 22-26 — Airport Operators Council Annual Membership Meeting, Deschler Hotel, Columbus, Ohio.

May 29—Aviation Day, Philadelphia International Airport.

June 3-4—Eleventh Annual Reading National Maintenance and Operations Meeting and Business Aircraft Awards, Reading Aviation Service, Reading, Pa.

July 14-16—Directors Meeting, National Association of State Aviation Officials, Atlantic City, N. J.

AERO COMMANDER

THIS COMPACT PANEL CONTROLS ALL OF THESE COM/NAV UNITS

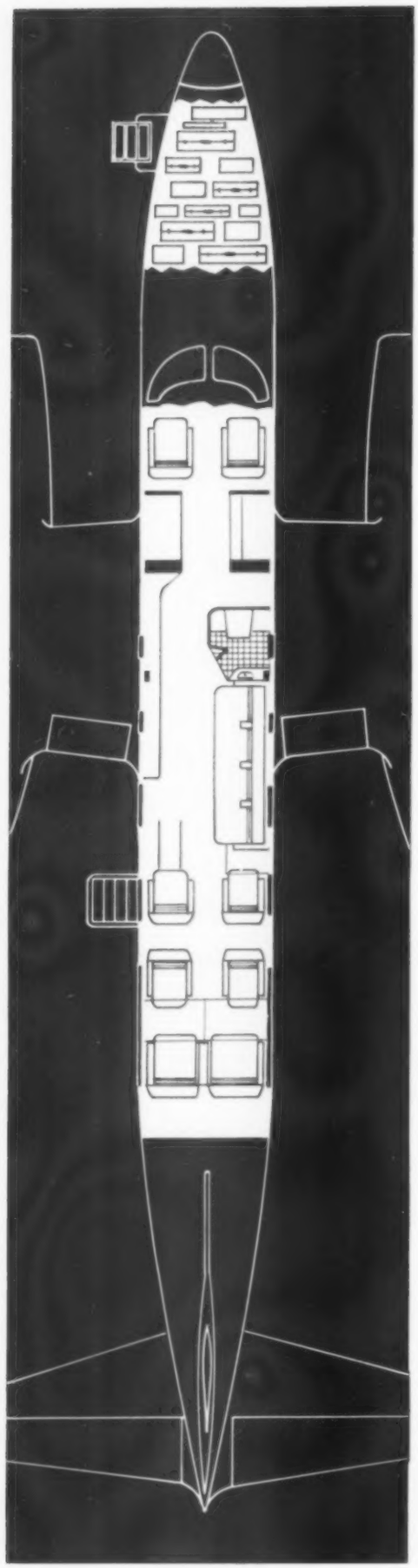
This centralized control panel represents a unique approach to convenient finger tip control of a completely integrated COM/NAV system utilizing minimum panel space. Equipment controlled includes **dual** VHF navigation systems, **dual** independent communication systems with 360 channel capability, ADF, three light marker beacon, all channel glide slope receiver, CD-1 Course Director, audio controls and cabin speaker amplifier. All basic units certified to **Category A** of applicable FAA TSOs or CAATC. Individual custom control components for all COM/NAV equipment shown are available at your ARC dealer. Ask him for additional information about this and other systems offered by ARC.

TYPICAL INSTALLATION SHOWS C-77C CONTROL UNIT USING ONLY A 7 INCH BY 10 INCH AREA OF THE INSTRUMENT PANEL

Aircraft Radio Corporation

BOONTON, NEW JERSEY

RESEARCH, DESIGN, DEVELOPMENT AND PRODUCTION OF DEPENDABLE COMMUNICATIONS, NAVIGATION AND RELATED ELECTRONIC EQUIPMENT SINCE 1928



BISCAYNE-26

FEATURE FOR FEATURE, THE BISCAYNE-26 PROVIDES MORE CABIN COMFORT THAN ANY STANDARD EXECUTIVE B-26

- Clear passageway, from the pilot compartment to the passenger cabin, is achieved by replacing both carry through wing-spars with aluminum spar rings. Original wing attach points are moved outboard ten inches from the fuselage center line, providing a lower noise level in cabin and cockpit.

- Cabin area aft of the forward spar ring to the empennage bolting point is completely new. Main passenger cabin is increased to 18′ 8″ aft of the rear spar ring to the rearmost cabin bulkhead. This increase in passenger cabin length is longer by 70″ than any standard-executive B-26.

- New, full-complement buffet, radio rack and lavatory are located in the area between pilot compartment and rear fuselage spar ring, clearing the passenger cabin for seats and furniture.

- Cockpit canopy is completely remanufactured, eliminating original hatches and greatly reducing the cockpit and cabin noise level.

- Nine cabin windows of double thickness tinted-glass are installed in the cabin . . . including two large panoramic windows.

- A completely new, 10 passenger interior, tailored to customer tastes and requirements will be installed, including specially designed seats.

- New ramp-stair door is conventionally located on the left side of the fuselage.

- Exterior will be painted to customer specifications and design.

These and other exclusive features have been engineered and developed by L. B. Smith Aircraft Corporation. Full specifications regarding the Biscayne-26 are available on request.

L. B. SMITH AIRCRAFT CORPORATION

INTERNATIONAL AIRPORT • MIAMI • FLORIDA

Howard Aero at San Antonio International

...happy choice for your South Texas stops

Check the weather ahead in this luxurious flight lounge, pick up a catered dinner, or drive a rent-a-car from the airport. Here you enjoy the finest personal service. Your plane receives the finest aviation fuels and lubricants – Humble aviation products refined *beyond* military specifications to give you top flight power and performance. When you map your stops at the Humble sign, you get the best fuels and lubricants *and* the best service.

HUMBLE

AVIATION PRODUCTS

HUMBLE OIL & REFINING COMPANY

THE ALL NEW

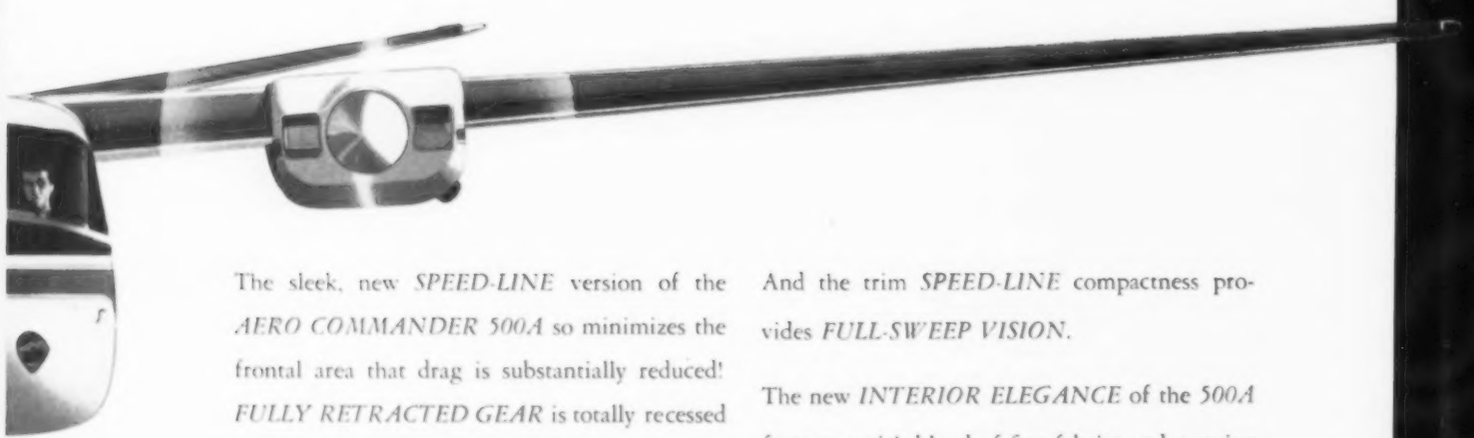
AERO COMMANDER 500A

first of a brilliant series featuring the

SPEED-LINE NACELLE

a new, compact design that

INCREASES SPEED and PERFORMANCE



The sleek, new *SPEED-LINE* version of the *AERO COMMANDER 500A* so minimizes the frontal area that drag is substantially reduced! *FULLY RETRACTED GEAR* is totally recessed within the nacelle. There's *NEW POWER*, too. The 260 hp Continental engines feature *FUEL-INJECTION!* And the *500A* is capable of speeds up to *230 MPH!*

The new design releases exhaust above the high wing making the *CABIN WHISPER-QUIET*. And the trim *SPEED-LINE* compactness provides *FULL-SWEEP VISION*.

The new *INTERIOR ELEGANCE* of the *500A* features a rich blend of fine fabrics and genuine leather in your choice of beautiful colors. Call WHitney 9-5674 for complete details about the all-new *AERO COMMANDER 500A*, first of a brilliant, new series featuring the *SPEED-LINE NACELLE!*

AERO DESIGN & ENGINEERING CO. • BETHANY, OK

AERO COMMANDER

OKLAHOMA • A Subsidiary of ROCKWELL-STANDARD Corporation

New-look Aero Commanders feature new long, thin, airfoil-shaped engine nacelles with 40% less frontal area than old type. Wheel rotates during retraction to lie flat in well behind wing trailing edge.

—(Aero Design Photo by Wayne Entriken.)

New Aero Commanders For 1960

By TOM ASHLEY

FOUR new Aero Commander models for 1960 were unveiled last month by Aero Design & Engineering Company at its annual distributor sales meeting in Oklahoma City. They feature 220 to 244-mph. cruising speeds, establishing new record-high performance standards for light twins, and incorporate completely new engines in new low-drag nacelles with top-of-wing exhaust for quietness, new landing gear and other new equipment.

The new 6-7-place Commanders, all with fuel-injected engines, are:

Model 500A, with fuel-injected 260-hp. Continental IO-470M engines, 220-mph. cruise, 156-gal. fuel capacity for 1,420-mile range on 45% hp. with 30-min. reserve, 1,925-lb. useful load and $72,000 price.

Model 500B, with fuel-injected 290-hp. Lycoming IO-540 engines, 222-mph. cruise, 156-gal. fuel capacity for 1,250-mile range on 55% hp. with 30-min. reserve, 2,235-lb. useful load and $81,500 price.

Model 560F, with geared and fuel-injected 350-hp. Lycoming engines, 234-mph. cruise, 223-gal. fuel capacity for 1,500-mile range on 55% hp. with 30-min. reserve, 2,430-lb. useful load and $98,500 price.

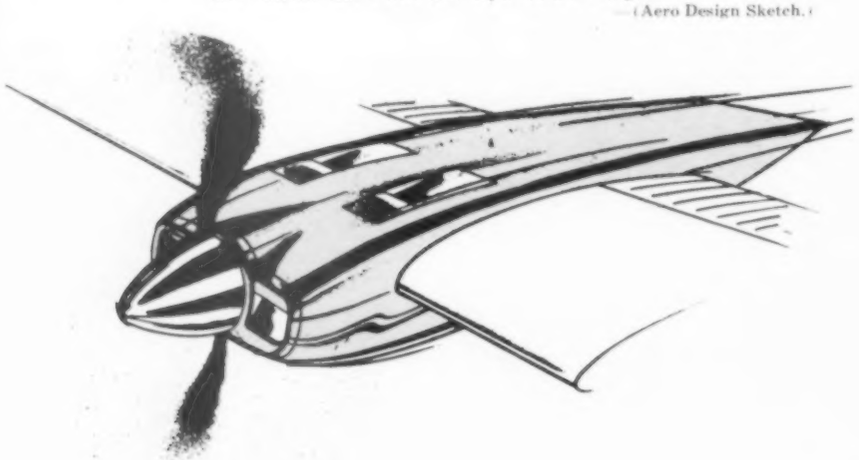
Model 680F, with supercharged, geared and fuel-injected 380-hp. Lycoming IGSO-540 engines, 244-mph. cruise, 223-gal. fuel capacity for 1,400-mile range on 55% hp. with 30-min. reserve, 3,200-lb. useful load and price of $113,500.

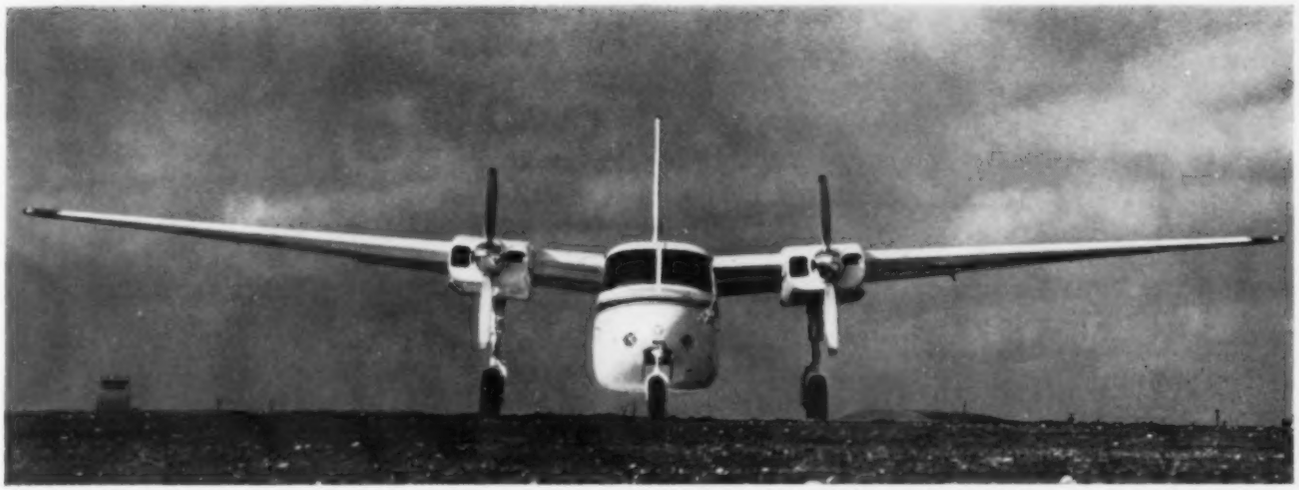
All available specification and performance details on the four new models are contained in a tabulation of factory data on page 23. The Model 500A figures are based on extensive flight testing; performance figures for the other three models are calculated and preliminary but the company described them as conservative. A fifth new model, an "A" version of the current Model 720 Alti-Cruiser, which features the only pressurized and air-conditioned cabin available in the light-twin business aircraft category, will be brought out next December.

The new models incorporate the most extensive changes ever undertaken across the line of Commanders. Engineering on them began a year ago to the month and new-item changeovers were fed into the production department beginning last February in a gradual process which was completed by the end of March, at which

Sketch of new Aero Commander nacelle shows small exhaust chutes atop wing, with small electric cowl flaps, small nose air intake openings and airfoil shape of nacelle for lift. Thrust line is about 4 inches higher than on old-type engine installation and new nacelle has 9 ins. less depth under wing.

—(Aero Design Sketch.)





Small frontal area of new nacelles is seen in this head-on view of Model 500A. All new Commanders have fuel-injected engines.
—(Aero Design Photo by Wayne Entriken.)

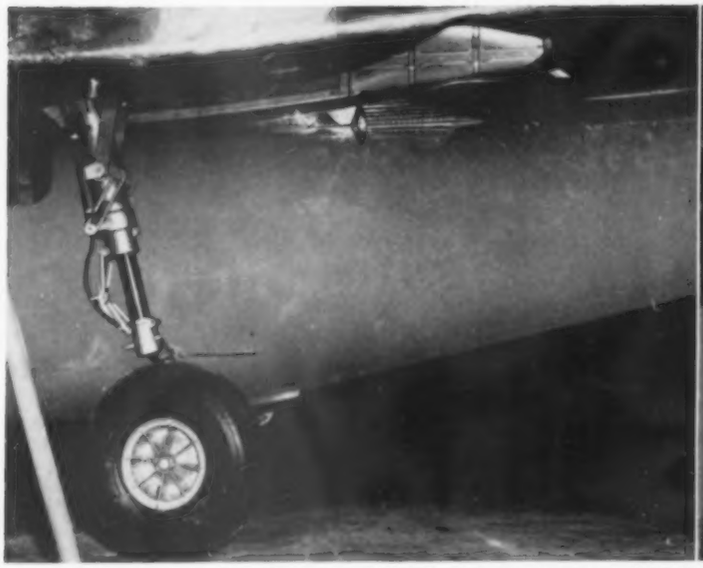
time everything on the line was new-model production. Although this did not completely halt the delivery of airplanes, it did slash output from 17 or 18 airplanes in March to only 6 or 7 new models scheduled for April, and it will take several months for the flow to catch up.

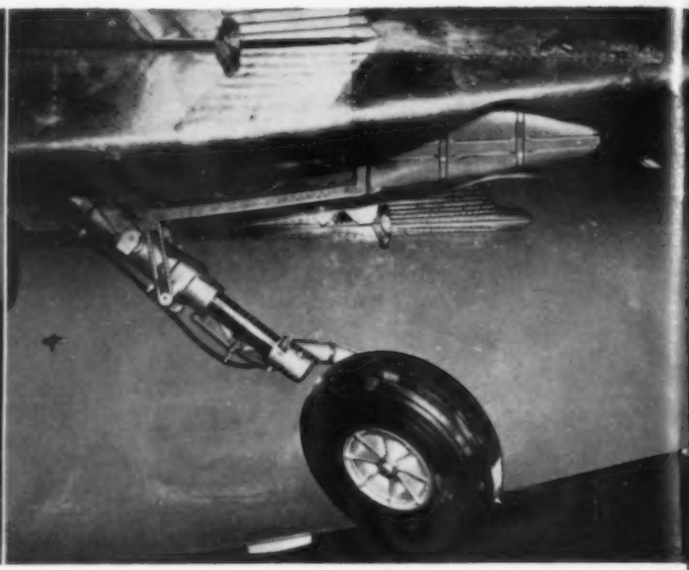
Most distinctive new development is a new compact, airfoil-shaped, low-drag engine nacelle, which reduces frontal area 40%, raises the thrust-line about 4 inches, directs exhaust out over the top of the wing and nacelle and conceals the main gear wheel behind the wing trailing edge. So that the wheel can be completely retracted into the flatness, or minimum thickness, of the nacelle afterbody, a cam-and-lever action twists or rotates the main wheel 90 degrees during retraction and the retracted wheel rides in a horizontal position. Landing gear doors enclose the strut but the wheel well itself does not have doors.

Engine makers cooperated with Aero Design in the nacelle development by reducing the engine envelope to a minimum. Continental engines are used for the first time by Aero Design, powering the 500A. The other three models use Lycomings — the new 540-cu. in. engine in direct-drive, geared-drive and supercharged versions, all with fuel injection. These are the first fuel-injected 540's to go into production-model light twins.

Lycoming had not released full details of the new engines at the time of the the sales meeting. But Ted R. Smith, Aero Design vice president in charge of research development and engineering, discussed their injection systems briefly as follows: "The Lycoming IO-540 fuel injection system is similar to that on the Continental IO-470M, the Continental system being a positive displacement type which

More cabin visibility is provided by new flattened nacelles, as this portrait shows. Top-of-wing exhaust moves noise away from cabin and raised thrust line reduces amount of propeller arc near cabin.
—(Aero Design Photo by Wayne Entriken.)



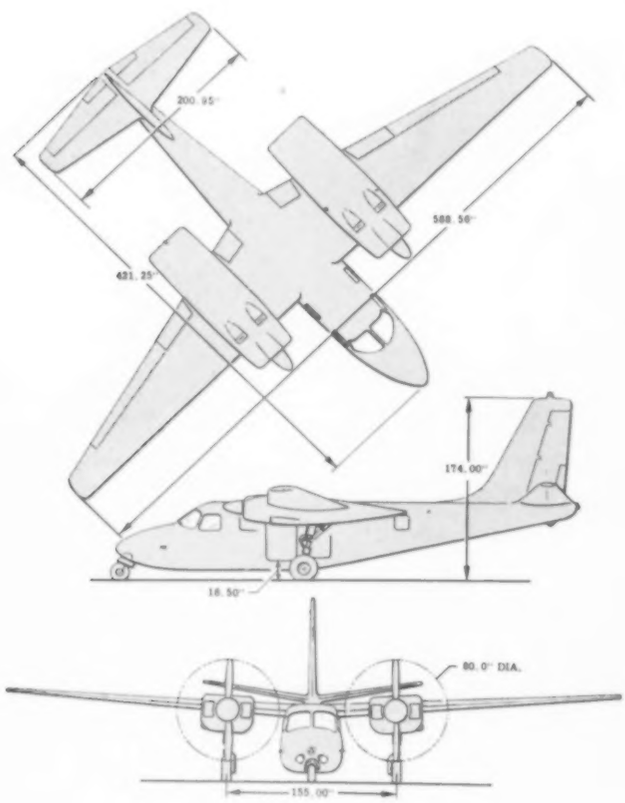


Sequence photos of landing gear retraction cycle show how wheel is turned during retraction to lie flat inside wheel well. Doors whi enclose produced by Electr for Aer

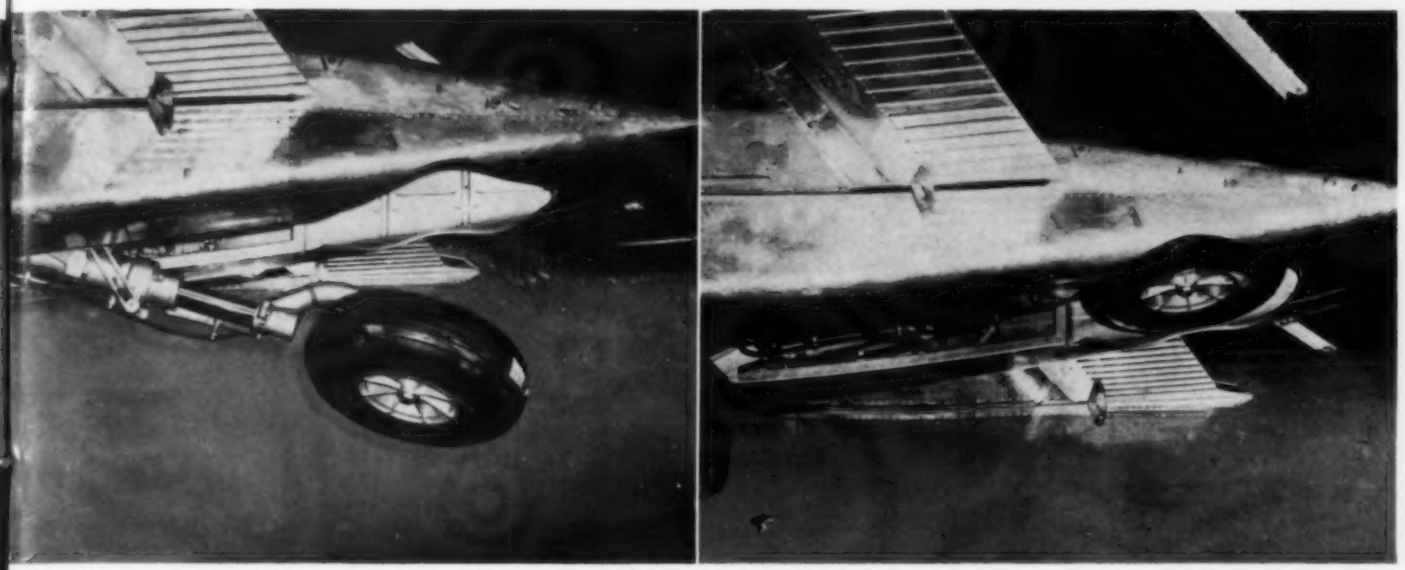
meters fuel directly into the cylinders in a process by which a goodly part of the fuel which is pumped is returned to the tank. Both IO-470M and Lycoming IO-540 are manually leaned with use of a pressure gauge. Lycoming IGO-540 and IGSO-540 engines feature a new speed-density-ratio fuel injection system with automatic adjustment for altitude. Its control has two positions — one for automatic rich in take-off and climb and another for automatic leaning for cruise. This speed-density type has provision for manual lean at a position below automatic lean when equipped with flow meters." Smith said the new engine's system is an improvement over the injection system employed with the IGSO-480 Lycoming.

In going to the new engines, Aero Design changed over from built-up engine mounts to forged aluminum engine mounts. These and new forged aluminum trusses for the main landing gear were designed and produced for the Aero Commander line, which also uses newly-designed and produced Electrol main landing gears. The new engine mounts, plus the engine smoothness of fuel injection, contribute to greatly reduced vibration. The new landing gear and its trusses provide for greater gross weights. With greater power, considerable beef-up was accomplished and complete new analysis was conducted of flutter and vibration, involving a large volume of engineering test work.

For the highest speeds yet offered, test work was conducted to certificate new and higher red-line and yellow-



Three-view drawing gives Aero Commander dimensions in inches. Span is 49 ft. 6 ins., length 25 ft. 1¼ ins., and height 14 ft. 6 ins. Two-blade props are on Models 500A and 500B and 3-blade props are used on 560F and 680F. View of interior (below) shows new individual chairs and individual light-and-ventilation units flush-mounted by each chair. Note corner of fasten-seat-belt-no-smoking sign in headliner above co-pilot's seatback.



enclose strut were removed for these photos. Rotation of wheel is by simple lever action. Landing gears are new design developed and for Aero Commanders.

—(Aero Design Photos by Wayne Entriken.)

line limits of 288 mph. and 230 mph. respectively, on the airspeed indicator for all models. Preceding models were red-lined at 270 mph. and yellow-lined at 210 mph. Published top speeds for the four new models are 230, 233, and 250 mph. TAS for the 500A, 500B and 560F and 255 mph. TAS at sea level and 290 mph. TAS at 15,000 ft. for the 680F. Cruising true airspeeds on 70% hp. at 10,000 ft. for the four new models are listed at 220, 222, 234 and 244 mph., respectively. Nearest competitive cruising speed published for other makes of light twins is 220 mph. for a twin of less weight. Thus the new Aero Commanders have scored a significant break-through in advancing speeds another notch higher for light twins, becoming the first of any current-production make to surpass the 230-mph. and 240-mph. marks for cruising speeds. It advances the modern light business twin well into the speed category dominated for so long by Convairs and converted corporate Lodestars.

Along with higher speeds, the new Aero Commanders have scored important new advances in emergency single-engine performance. Single-engine rate of climb at gross weight and at sea level, with the dead engine feathered, is listed at 430 fpm. for the 500A, 410 fpm. for the 500B, 520 fpm. for the 560F and 400 fpm. for the 680F. Until these new models came out, the highest single-engine rate of climb was 440 fpm. for a lighter-gross competitive twin. In single-engine service ceilings at gross weight, the new Commanders top all competition, these being 10,100 ft. for the 500A, 8,750 ft. for the 500B, 10,300 ft. for the 560F and 16,100 ft. for the 680F.

New standards for short-field operations are also accomplished by the new Aero Commanders. Take-off and landing distances, respectively, at gross weight, sea level and over 50-ft. obstacle, are 1,200-1,130 ft. for the

(Continued on page 66)

New Aero Commanders for 1960

Factory Data

	Model 500A	Model 500B	Model 560F	Model 680F
Price	$72,000	$81,500	$98,500	$113,500
No. Seats	6-7	6-7	6-7	6-7
Engine Model	IO-470-M	IO-540	IGO-540	IGSO-540
Tot. Take-off Hp.	520	580	700	760
Gross Wt., lbs.	6,000	6,500	7,000	8,000
Empty Wt., lbs.	4,075	4,175	4,570	4,800
Useful Load, lbs.	1,925	2,325	2,430	3,200
Useful Pct. of Gr. Wt., %	32.0	35.8	34.7	40.0
Std. Fuel Cap., gals.	156	156	223	223
Oil Cap., gals.	6	6	10	10
Top Spd., mph.	230	233	250	290
Cr. Spd., 70% hp. at 10,000 ft., mph.	220	222	234	244
Cr. Spd., 60% hp. at 10,000 ft., mph.	208	N. A.	N. A.	N. A.
Cr. Range with 30 mins. Res., mi.	1,400	1,250	1,500	1,400
Stall Spd., flaps-gear down, mph.	61	63	66	71
Minimum SE Control Spd., mph.	70	N. A.	N. A.	N. A.
Rate of Climb, fpm.	1,570	1,590	1,750	1,660
SE Rate of Climb, fpm.	430	410	520	400
Service Ceiling, ft.	23,500	21,000	21,900	28,500
SE Service ceiling, ft.	10,100	8,750	10,300	16,100
Take-off Dist. Over 50-ft. Obst., ft.	1,200	1,300	1,070	1,380
Landing Dist. Over 50-ft. Obst., ft.	1,130	1,155	1,210	1,330
Wing Area, sq. ft.	255	255	255	255
Wing Loading, lbs. sq. ft.	23.53	25.49	27.45	31.37
Power Loading, lbs. hp.	11.54	11.20	10.77	11.11
Span, ft.-ins.	49-6	49-6	49-6	49-6
Length, ft.-ins.	35-1¼	35-1¼	35-1¼	35-1¼
Height, ft.-ins.	14-6	14-6	14-6	14-6
Tread, ft.-ins.	12-11	12-11	12-11	12-11
Cabin Length, ins.	127.5	127.5	127.5	127.5
Cabin Width, ins.	52	52	52	52
Cabin Height, ins.	53	53	53	53
Cabin Door, ins.	43 by 28	43 by 28	43 by 28	43 by 28
Cabin Volume, cu. ft.	177	177	177	177
Bag. Compt. Height, ins.	41	41	41	41
Bag. Compt. Width, ins.	47	47	47	47
Bag. Compt. Length, ins.	31	31	31	31
Bag. Compt. Volume, cu. ft.	32	32	32	32
Bag. Door, all models, 23½ by 19½ ins.				

NOTES: All performance is for gross weight at sea level unless noted. Model 500A performance is actual; others calculated. N. A. means not available. All speeds guaranteed within 3%, all climbs, ranges and altitudes guaranteed within 8%. Cont. fuel-injected IO-470-M rated at 2,625 rpm. Lyc. fuel-injected IO-540 rated at 2,575 rpm. Lyc. fuel-injected and geared IGO-540 rated at 350 hp. at 3,400 rpm. for take-off and 325 hp. at 3,000 rpm. continuous. Lyc. fuel-injected, geared and supercharged IGSO-540 rated 380 hp. for take-off at 47 ins. at sea level and 41 ins. at 3,400 rpm. at critical altitude, and 360 hp. continuous at 45 ins. at sea level and 40 ins. at 3,200 rpm. at critical altitude. Cruising range figures are for 45% hp. 181 mph. and 10,000 ft. for Model 500A and 55% hp. for other models, with speed for this configuration not available. Above information released by factory on March 28, 1960.

New exhaust system uses short tailpipe on lower side of cowling. Accessory section has ventilator.

Riley 310R Conversion

SIMPLE but ingenious modifications and improvements engineered by Riley-Kelly Aircraft, Ltd., of Ft. Lauderdale, Florida, have been combined in a conversion kit for modernizing standard Cessna 310's with more power, speed, performance, efficiency, fuel capacity, range and comfort. The basic 310's modernization has proved worthwhile because the compact Cessna has established itself as a classic design with standout aerodynamic efficiency and high performance — the same inherent qualities which endowed classics such as the Beech 18, Lockheed Lodestar and Douglas DC-3 for decades of usefulness through improvements continually updating their capabilities.

Calling its complete conversion the "Riley Super-Customized 310R," the firm has modernized 17 Cessnas for its customers and last month had seven 310's converted or in various stages of conversion at its Cessna modification center at Ft. Lauderdale's Broward International Airport near Miami. It offers four different modernization packages: (1) Conversion of customer's 310 without engine change but including new under-wing exhaust system; (2) conversion of customer's 310 including complete new engine installation using 260-hp. fuel-injected IO-470-D Continental engines; (3) completely modernized airplane with zero-time 240-hp. Continentals, and (4) completely modernized airplane with new fuel-injected 260-hp. Continentals. Prices are (1) $11,850; (2) $20,850; (3) $45,000 and (4) $51,-

Lineup of Riley conversions awaiting delivery at modification center in Florida. Note airfoil nacelle extensions, distinctive paint design.

000, the latter two including standard nav-comm radio installations.

The Riley conversion includes the following: New under-wing engine exhaust and cooling system; new 40-gal. auxiliary fuel system with molded fiberglass nacelle tanks; new B-type engine mounts; new exterior aerodynamic smoothing and custom paint job; new 1-piece windshield, new tinted windows, new custom interior, new custom instrument panel, new custom radio panel and new cabin ventilating system. To these are added either zero-time 240-hp. engines or new fuel-injected 260-hp. IO-470-D engines complete with all baffling, fuel pumps, gauges and controls and propeller modifications.

By converting the exhaust system from atop the wing to below the wing, three improvements are accomplished: (1) Exhaust noise is moved away from the cabin for improved quietness inside, (2) the area originally used for the exhaust system atop the wing and behind the firewall is made available for a new aft-nacelle fuel tank of 20-gal. capacity and shaped as an airfoil for improved airflow, lift and stability, and (3) bends in the exhaust flow are eliminated for reduced back-pressure and more straightforward engine cooling. No augmentor tubes are used, these and their drag having been dispensed with in a refinement of the under-wing exhaust system. Stationary ventilators are used for the accessory section of the nacelles.

Replacement of the original engine mounts with new B-type mounts eliminates vibration and noise transmission through the frame.

Surface smoothing and high-gloss finish are apparent in this view of the 310R. With exhaust system moved from top of wing, plastic fuel tank was designed to carry nacelle to wing trailing edge.

Considerable lowering of the cabin noise level was accomplished with extensive soundproofing and new windows and windshield to take advantage of the under-wing exhaust location. The 1-piece windshield provides more visibility and adds to the 310's impressive streamlined appearance. Custom instrument and radio panels provide added space and more efficient panel arrangement for transport-type, dualized installations with radios and their controls located at the center between flight and engine groups. Custom interiors are of luxury-grade materials and include extensive use of plush carpeting.

Aerodynamic smoothing is accomplished in three steps after stripping all paint. A putty-type material is used to cover skin seams and joints. After it cures, an epoxy primer is applied. The surfaces are then sanded to extreme smoothness before high-gloss enamel is applied. The result is a uniformly smooth exterior skin and piano-finish paint job with minimum drag. The smoothing was adapted from a process used in finishing supersonic military aircraft.

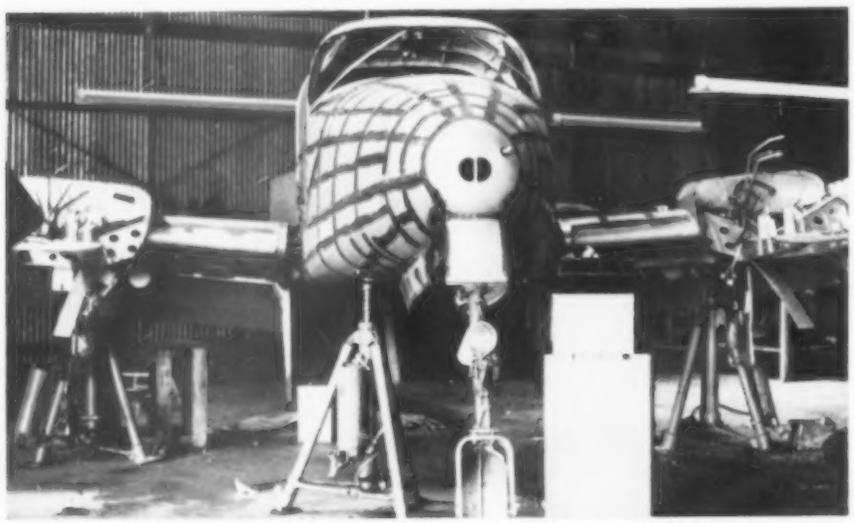
Performance improvements are impressive. Summed up, they give the airplane a cruising speed in excess of 230 mph. at 8,000 ft. using 65% of power with the 260-hp. fuel-injected engines; 40% more fuel capacity for more range, including a high-speed all-out

New-look conversion features single-piece windshield for greater visibility.

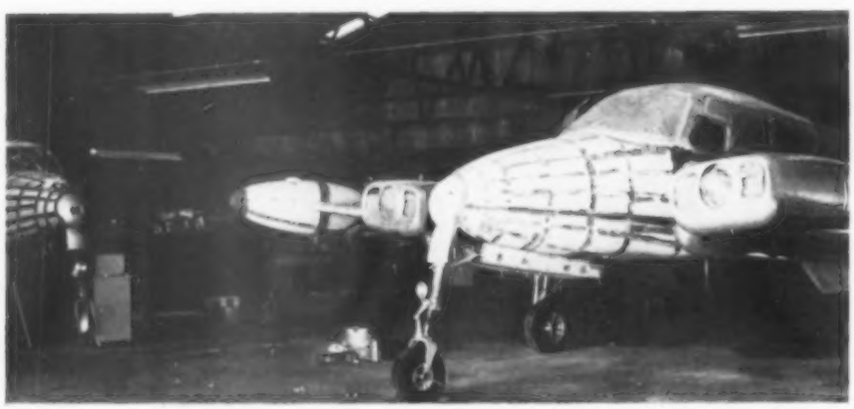
Custom interior, custom instrument and radio panels and new single-piece windshield with new tinted windows are featured in conversion.

range of 1,430 miles; improved single-engine performance including a single-engine service ceiling of more than 10,000 ft., and a 10-mph. reduction in stall speed and single-engine minimum control speed.

Weight-wise, the new under-wing engine exhaust system conversion, including new aft-nacelle fuel tanks, weighs one-half pound less than the original exhaust augmentor system atop the wing. Fuel-injected new engine installations add 20 lbs. each side. Aerodynamic smoothing, paint and soundproofing add 35 lbs.



Riley conversions are stripped inside and out for new engine mounts, exchange or fuel-injected 260-hp. engine replacement, new exhaust and cooling systems, new auxiliary nacelle tanks, new custom interior, instrument and radio panels, new cabin ventilating system, new windows and windshield, and extensive surface smoothing with high-gloss finish. Stripes are filler material applied over skin joints and seams. White material in photo below is epoxy primer.



In a demonstration at Ft. Lauderdale, the Riley demonstrator showed a cruising climb of 800 fpm. indicating 150 mph. At 8,000 ft., using 23 inches manifold pressure and 2,300 rpm., it indicated 205 mph. with outside air temperature of 40 degrees for a true air speed of about 234 mph. on 64% of power. At an altitude of 2,000 ft., using 23 inches and 2,300 rpm. with outside air temperature of 50 degrees, it indicated 210 mph. on 63% of power. With the right engine feathered, and using 75% of power on the good engine with 24 inches and 2,450 rpm., single-engine cruising speed was 175 mph. With two people and 75 gals. of fuel for a demonstration of single-engine ceiling at altitude, the right engine was feathered at 13,500 ft. The 310R was stabilized 20 mins. later on one engine at 13,100 feet with an indicated air speed of 110 mph. Trimming the nose for 100 mph., it climbed to 13,200 ft. in 5 mins.

Riley says the conversion with 240-hp. engines is 11 mph. slower than the 260-hp. conversion at 10,000 ft., cruising speed being 220 and 231 mph. respectively using 60% of power.

Aerodynamic clean-up and the new airfoil nacelles give the conversion exceptional directional stability in hands-off flight for long periods of time. It just bores straight ahead, with no tendency to oscillate or lower a wing.

The conversions are performed in a Riley-Kelly Aircraft shop specializing in 310's only. The firm is enlarging its conversion force to turn out two airplanes a week, down-time being three weeks per airplane.

Retouched photo shows Beech 18 with Conrad kit's new exhaust chutes and cowl flaps, new single-piece windshield, stabilizer angle of incidence change and new stubby wingtips for low drag and high lift.

New Conrad 9,800 Conversion

CONRAD International Corporation of Ft. Lauderdale, Florida, has developed a new FAA-approved conversion kit which provides fuel-injected engines and 9,800-lb. gross weight for Twin Beech models of D18S, E18S and C-45G and H series.

Although specific figures were not released, Conrad said the new modernization developments give the Twin Beech 43% more useful load at better than 20% more speed for 20% more range, all with improved handling and stall characteristics.

Heart of the new system is Conrad's modification of the 450-hp. Pratt & Whitney radial engine to equip it with fuel injection. A Simmonds SU-580 fuel injection speed-density system is installed. It injects the fuel into the engine's supercharger impeller, eliminating carburetor icing hazards and assuring full 450-hp. engine power and more precisely controlled economical cruise settings. Automatic mixture control is used.

Included in the power package modification are new dishpans, new baffles, new air scoops, new jet augmentor-type stacks and exhaust chutes, new electrical cowl flaps and other cowling modifications for improved and more efficient boundary layer control.

Either Hamilton-Standard or 3-bladed Hartzell propellers are used, the latter providing a 152-lb. weight savings and slightly better performance. With the Hartzell installation, a cross-over unfeathering system is provided, supplying oil pressure from the operating engine to the feathered propeller for positive unfeathering.

Significant other Conrad modernization items include new high-lift low-drag wing tips. These tips are of fiberglass construction and house omni-navigation and communications antennas. They also result in a reduction of wing span.

A change in the stabilizer angle of incidence reduces frontal area in cruising attitude and permits gross load cruise with neutral elevator trim, as provided on the E18S Beech, which will not have its stabilizer angle of incidence changed by the new kit. Elevator gap seals are provided for both top and bottom surfaces for drag reduction.

A new one-piece panoramic windshield provides more visibility and its installation eliminates leakage. In addition to improving the looks of the airplane, the new windshield's installation also saves weight.

New and improved stall strips are used.

Conrad says the new 9,800 modernization can be performed by local repair stations from complete blueprints or by the firm's own facilities in Ft. Lauderdale, with down-time estimated at 10 working days.

Conrad International Corporation, a newly organized firm, serves as domestic and foreign sales representative for Conrad Aircraft Manufacturing, Inc., and Aircraft Fuel Injection, Inc., of Ft. Lauderdale. E. P. Lunken, long-time Cincinnati aviation figure, is president of the organization, with William H. (Bill) Conrad of Ft. Lauderdale as vice president. Home offices of Conrad International are at Lunken Airport in Cincinnati and other officers include H. E. Lunken, secretary; John Hilberg, treasurer, and John Sawyer, vice president.

Bill Conrad is the originator of speed kits for modernization of Beech Twins. Over the last several years, his kits have been widely marketed and applied to the classic Model 18 design, extending its usefulness for years.

Air Traffic Control Outlook For The Sixties

Editor's Note

Air traffic controllers — the men in the Centers and Towers — face increasing problems and difficulties as air traffic volume grows in magnitude. How these men view the future is outlined in the accompanying discussion by F. M. McDermott, executive director of the Air Traffic Control Association. Mr. McDermott's discussion was delivered before the Flight Safety Foundation's Fifth Business Aircraft Safety Seminar at Dearborn, Michigan, last month.

MANY have gazed into the crystal ball — the game of forecasting the future of aviation has fascinated a variety of experts from many and diverse fields. One of the most interesting aspects of many of these forecasts has been the consistency with which they have been wrong — and the error always seems to be one of underestimation. Ever since the airlines began to acquire aircraft faster and larger than the DC-3, the forecasts have indicated a levelling off, or in some cases an actual decline in the numbers of aircraft. The logic of handling a certain number of passengers with fewer aircraft has been advanced with the acquisition of each generation of faster and larger types. We all know now the fallacy of this reasoning — but no group has been so acutely aware of these incorrect forecasts as has been the air traffic control service, which each year has safely absorbed an increase of 15 to 20 per cent in traffic. The growth of general aviation, private and business, has been even more dramatic. We now think that a continued expansion of air traffic of approximately 15 per cent per year is a conservative estimate for the next decade.

Now what does this mean in terms of the future of air traffic control? It means that the capacity operation at our major airports will continue unabated. As the super-airports such as Dulles International commence operation, we will see a repetition of the conditions already experienced at Idlewild and O'Hare. As operations increase at the new airports, we cannot expect a compensating reduction at the existing fields. The present demand by airlines for scheduled operations during certain portions of the day greatly exceeds the capacity of many fields. Of even greater significance, however, is the fact that business flying is constantly increasing. And for every scheduled air carrier operation shifted to a larger field, due to conversion of the schedule to a higher performance type aircraft, you may rest assured that a general aviation flight will be there to replace it at the old field.

In many respects our present terminals, whose relatively short runways make them unsuitable for jet operation, are remarkably well suited for business and general aviation flying. Certainly the proximity of these airports to the business districts and industrial centers increases the utility of the business aircraft. Also, since most of this category of aviation includes fully instrumented aircraft, and highly skilled pilots, the corporation can again attain greater utility by operating into a fully instrumented airport. The waterfront fields in some cities offer some advantages in ground travel time — but are seriously limited during certain seasons of the year due to the vagaries of our weather.

New Tools For Controllers

To summarize this point — traffic will continue to increase during this coming decade. Airline traffic will grow, general aviation will expand by at least five thousand aircraft per year, and there are new signs pointing to the fact that military flights may not be phased out as rapidly as once predicted. A discouraging prospect? — perhaps, but far from hopeless. The brightest ray of hope lies in our corps of experienced and highly dedicated traffic controllers, manning the Centers and Towers, using tools of limited capability, but through it all maintaining a safety record that is the envy of the world. As we enter the new decade, we have complete assurance that this safety record will be maintained. But unless new tools are made available — unless a satisfactory air traffic control environment is established, this safety will be paid for in terms of expensive delays and general inconvenience such as we have not yet seen.

The air traffic control service of the Federal Aviation Agency, and the former Civil Aeronautics Administration, has done a truly remarkable job. Two of the most outstanding improvements during recent years have been made in the utilization of radar and direct pilot/controller communications. Unbelievable traffic handling estimates of ten years ago are now every-day occurrences. Since there are physical limits upon the number of aircraft that can be safely handled by one man, the air traffic control service has divided and subdivided areas of responsibility. Centers which operated 15 years ago with a complement of 40 men now have over 400. However, the solution of throwing more and more men into the fray has its limits. Whenever a one-man sector is divided between two men, there is a requirement for coordination. It now appears that in some instances we have reached or passed the point of diminishing returns. As aircraft increase in numbers, speed and general performance, the job of coordination becomes more and more critical. It is extremely unlikely that the air traffic control system can continue to keep pace with the growth in aviation through brute force.

It is inevitable, as we approach the limits of manual system capability, that we turn our attention to the field

(Continued on page 57)

This prototype Jetstar has production-model Pratt & Whitney JT-12 jets, engine thrust reversers, dual-wheeled gears and other changes.

Improved Jetstar Flying

FLIGHT tests are being conducted of the improved Lockheed Jetstar with a prototype modified with changes incorporated in production models. The first production model will begin flying in July and first deliveries to customers will be made in January, 1961.

Pictures on this page show the modified prototype of the 550-mph., 10-place corporate jet transport. It has four Pratt & Whitney JT-12 engines mounted on the rear of the fuselage. These new turbojets weigh only 430 lbs. each but deliver 3,000 lbs. of thrust each and have thrust reversers.

Newly released are sea level, standard-air actual landing distance capabilities and FAA required landing field lengths for three gross weight conditions of the Jetstar. With standard payload of 1,640 lbs. (8 passengers and baggage), they are as follows: For 22,500-lb. gross, 45 mins. fuel remaining, 1,750 ft. over 50-ft. obstacle and 4,200-ft. FAA field length; for 24,000-lb. gross, 45 mins. fuel remaining plus 200 miles, 2,660 ft. over 50-ft. obstacle and 4,430-ft. FAA field length, and for 28,000-lb. gross (maximum landing weight), with 45 mins. fuel remaining plus 945 miles, 3,000 ft. over 50-ft. obstacle and 5,000-ft. FAA field length. Thrust reversers account for the short landings.

Other views show modified Jetstar's new 4-engine installation, new wing leading edge, new external wing tanks and dual-wheeled gears.

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THE COMPLETE STORY OF THE NEW FLIGHT\SWEEP CESSNA LINE

the next best thing to taking a demonstration flight!

CES

CESSNA'S GREAT NEW NINE

poised, powerful, preferred...the world's best all-around light twin

310d

The Cessna 310d — Time and distance business barriers vanish under the sleek wings of the distinguished 310d. You move far, fast, and flexibly . . . solving problems . . . exploring new opportunities — wherever and whenever they exist. And the conference room quietness, the unmatchable beauty, comfort, and convenience of the 310d provide a perfect place to plan as you travel — a private office in the sky. The new flight/sweep Cessna ranges halfway across the nation — non-stop . . . provides executive lounge comfort for five at speeds up to 242 miles per hour. All this plus true twin-engine safety and performance!

SEATING CAPACITY	Five
MAXIMUM SPEED	242 mph
CRUISE SPEED	220 mph
MAXIMUM RANGE*	1440 miles
RATE OF CLIMB: Twin Engine	1800 ft./min.
Single Engine	440 ft./min.
TAKE-OFF RUN	800 ft.
LANDING ROLL**	620 ft.
SERVICE CEILING: Twin Engine	21,300 ft.
Single Engine	7,700 ft.
BAGGAGE CAPACITY	200 lbs.
GROSS WEIGHT	4830 lbs.
ENGINE	Two, 260-HP, Continental Fuel-Injection Engines

All Performance Figures are based on Gross Weight. * 130 gals. – **Maximum Landing Weight, 4600 lbs.

surging new power...
flight/sweep styling

SKYLARK

The Skylark . . . said simply, the flight/sweep Skylark for Sixty is a big airplane with a practical price tag! The best opportunity to add stepped-up power, performance, and prestige to your travel picture *without* leaving the economy plane class, the big, bold, beautiful Skylark offers "fabulous bonus features"* — features normally considered optional on other planes but built in and standard on the Skylark! All these plus all the traditional flight-ease features of the Cessna line . . . and all priced as an extra value package . . . to save you money!

*See Skylark product brochure equipment list

SEATING CAPACITY	Four
MAXIMUM SPEED	149 mph
CRUISE SPEED	142 mph
MAXIMUM RANGE	760 miles
RATE OF CLIMB	850 ft./min.
TAKE-OFF RUN	735 ft.
LANDING ROLL	590 ft.
SERVICE CEILING	15,900 ft.
BAGGAGE CAPACITY	120 lbs.
GROSS WEIGHT	2350 lbs.
ENGINE	175-HP, "Power-Geared," Continental

All Performance Figures Are Based on Gross Weight

outstanding dollar for dollar value leader

175

The Cessna 175 — Dollar for dollar, the smart-looking, swift-moving 175 is still unmatched in price and performance! Flight/sweep styled as the standard economy step-up choice, the 175 has also earned proven popularity as a first-choice airplane! Outstanding features such as an improved power-geared engine, "floating cowl" suspension, the new long, low look, and all the exclusive Cessna "drive up — drive down" flight features — *Para-Lift flaps, Land-O-Matic gear* and *high stability wing* — plus low initial price, amazing low maintenance and operational cost — makes the 175 the dollar for dollar value champion — the ideal way to leave competitors behind!

SEATING CAPACITY	Four
MAXIMUM SPEED	147 mph
CRUISE SPEED	140 mph
MAXIMUM RANGE	755 miles
RATE OF CLIMB	850 ft./min.
TAKE-OFF RUN	735 ft.
LANDING ROLL	590 ft.
SERVICE CEILING	15,900 ft.
BAGGAGE CAPACITY	120 lbs.
GROSS WEIGHT	2350 lbs.
ENGINE	175-HP, "Powered-Geared," Continental

All Performance Figures Are Based on Gross Weight

practical choice...positive performance perfect for modern business

172

The Cessna 172 — No more time and distance barriers to new and needed business. When you take control of new, fly-away business travel freedom in your own flight/sweep Cessna 172 for '60, you simply get in and GO! The only *full-size*, all-metal, 4-place, low-cost business airplane, the 172 gives a full measure of balanced business travel benefits — and then some! For out of the profit-proven past of the 172 comes a new design for a fabulous flying future! Greater speed, faster climb, longer range, and the new longer, lower flight/sweep look equip the 172 with improved performance and prestige — all designed to help you leave your competitors behind!

SEATING CAPACITY	Four
MAXIMUM SPEED	140 mph
CRUISE SPEED	131 mph
MAXIMUM RANGE	790 miles
RATE OF CLIMB	730 ft./min.
TAKE-OFF RUN	780 ft.
LANDING ROLL	680 ft.
SERVICE CEILING	15,100 ft.
BAGGAGE CAPACITY	120 lbs.
GROSS WEIGHT	2200 lbs.
ENGINE	145-HP, Continental

All Performance Figures Are Based on Gross Weight

handsome....handy...hardworking...
simple to fly...practical to buy!

150

The Cessna 150 features side-by-side seating for simple, effective flight instruction . . . all-metal construction for low maintenance and upkeep... Para-Lift flaps... Land-O-Matic gear... big, power-to-spare engine and high stability wing — all the exclusive Cessna "drive up — drive down" simplified flight features . . . perfect for safe, dependable flight training, inter-city commuting or patrolling.

SEATING CAPACITY	Two
MAXIMUM SPEED	124 mph
CRUISE SPEED	121 mph
MAXIMUM RANGE	630 miles
RATE OF CLIMB	740 ft./min.
TAKE-OFF RUN	680 ft.
LANDING ROLL	360 ft.
SERVICE CEILING	15,300 ft.
BAGGAGE CAPACITY	80 lbs.
GROSS WEIGHT	1500 lbs.
ENGINE	100-HP Continental

All Performance Figures Are Based on Gross Weight

180

The Cessna 180 — Profit-packed payload . . . power-to-spare engine . . . high stability wing . . . perfect for out-of-the-way travel and transportation. The high performance 180 adds power, payload, range, and extra versatility to the Cessna utilaplane concept. Perfect for places other planes cannot get into and out of — the 180 is convertible to floats and skis . . . can serve as a passenger plane or cargo ship!

SEATING CAPACITY	Four
MAXIMUM SPEED	170 mph
CRUISE SPEED	160 mph
MAXIMUM RANGE	845 miles
RATE OF CLIMB	1130 ft./min.
TAKE-OFF RUN	555 ft.
LANDING ROLL	350 ft.
SERVICE CEILING	21,500 ft.
BAGGAGE CAPACITY	120 lbs.
GROSS WEIGHT	2650 lbs.
ENGINE	230-HP Continental

All Performance Figures Are Based on Gross Weight

doing more jobs better than any other...
the unmatchable "mighty middle" line

SKYLANE

The Skylane — Luxury step-up choice in the medium-price field, the great new *fully equipped, fully painted* flight/sweep Skylane is *fully fitted* for a fast, "stay-ahead" travel future . . . offering outstanding *high-stability wing, Land-O-Matic handling ease,* power-to-spare for speed and climb, cross country range, new third window visibility, extra head room, maximum stretch out leg room, unmatchable interior elegance and convenience . . . and all package-priced to let you travel "stateroom class" without leaving the medium-price range!

SEATING CAPACITY	Four
MAXIMUM SPEED	170 mph
CRUISE SPEED	160 mph
MAXIMUM RANGE	845 miles
RATE OF CLIMB	1030 ft./min.
TAKE-OFF RUN	555 ft.
LANDING ROLL	560 ft.
SERVICE CEILING	19,800 ft.
BAGGAGE CAPACITY	120 lbs.
GROSS WEIGHT	2650 lbs.
ENGINE	230-HP Continental

All Performance Figures Are Based on Gross Weight

designed for decathlon duty...
built to bring out the best in business flying

182

The 182 . . . millions of miles of *balanced high performance* has earned the title "decathlon performer" for the flight/sweep Cessna 182 for Sixty . . . Powerful, instantly ready for action, the 182 again leads its class in performance, styling, and prestige! Big stretch-out cabin for four . . . Land-O-Matic gear, high-stability wing . . . Para-Lift flaps . . . new third window visibility . . . plus the great new "GO" look of flight/sweep styling . . . marks the 182 as the best standard medium-price value!

SEATING CAPACITY	Four
MAXIMUM SPEED	167 mph
CRUISE SPEED	157 mph
MAXIMUM RANGE	835 miles
RATE OF CLIMB	1030 ft./min.
TAKE-OFF RUN	555 ft.
LANDING ROLL	560 ft.
SERVICE CEILING	19,800 ft.
BAGGAGE CAPACITY	120 lbs.
GROSS WEIGHT	2650 lbs.
ENGINE	230-HP, Continental

All Performance Figures Are Based on Gross Weight

the first and only single-engine commercial airplane with high stability wing ... retractable landing gear

210

The all-new Cessna 210 . . . perfectly fills the need and the speed requirements / of modern businessmen. The big, power-to-spare, 260-HP engine / with simplified fuel injection / provides a smooth, safe cruise speed of 190 mph / extra "spare nothing" elegance in interior materials selection and styling adds comfort, convenience, and a fabulous feeling of fly-away freedom / to a host of modern flight-ease features / all of which make the all-new 210 the most complete / the most wanted / package of single-engine power / performance / and prestige / available today!

SEATING CAPACITY	Four
MAXIMUM SPEED	199 mph
CRUISE SPEED	190 mph
MAXIMUM RANGE	1100 miles
RATE OF CLIMB	1300 ft./min.
TAKE-OFF RUN	740 ft.
LANDING ROLL	520 ft.
SERVICE CEILING	20,700 ft.
BAGGAGE CAPACITY	120 lbs.
GROSS WEIGHT	2900 lbs.
ENGINE	260-HP, Continental, Fuel-Injection Engine

All Performance Figures Are Based on Gross Weight

CESSNA

Feature by feature — from rugged, wide-span landing gear to plus-reserve, power-mobility engines — each new Cessna in the world's most complete business air fleet — the 150, 172, 175, Skylark, 180, 182, Skylane, the all-new 210 and 310d — is *flight rated finest* in its class. To learn how you can buy and fly the Cessna you need . . . at a practical investment . . . plan to consult with us NOW. We'll show you how the Cessna of your choice can pay for itself in assured business efficiency!

flight-rated

NINE BEST

for business on the move

310d

210

SKYLANE

LUXURIOUSLY STYLED...

GENEROUSLY APPOINTED...FOR QUIET ELEGANCE, MAXIMUM COMFORT

You can relax while you leave your competitors behind when you travel in a Great New Flight/sweep Cessna for Sixty. Miles literally, swiftly fly by big "panoramic" picture windows . . . you're scarcely aware of the passage of time . . . for each Cessna cabin is styled like a spacious stateroom . . . luxurious stretch-out seating comfort . . . hand-crafted elegance . . . soft toned color harmony and incomparable convenience . . . everything to make business a profitable pleasure!

Step in the Cessna of your choice and *see and feel* for yourself . . . test the immediate softness, underlying firmness of exclusive Polycloud seating . . . relax in the tasteful interiors done in the finest of fabrics, carpetings, and trim materials . . . check the amazing array of comfort and convenience extras, *all at your fingertips* — and then? Ask how you can buy and fly the Cessna you need. You'll be amazed at how simple both are!

FREE V. P. M. ANALYSIS: V. P. M. — Value Per Mile — simply means the **cents per mile your company can economically justify for a business airplane.**

With the answers to seven simple travel questions, our representative can provide a Value Per Mile Analysis for your company. You can actually see an accurate study of how much farther and faster you can travel in a Cessna . . . and how little it will cost! No obligation, of course.

FINANCING Cessna dealers offer a convenient, practical financing program. Your Cessna dealer has all the details and can arrange financing terms for you quickly and easily. Lease plans are also available.

RENT-A-PLANE Rent a plane just like you rent a car. Fly yourself or with pilot provided. Available nationally. Call your Cessna dealer for complete details.

COOPERATIVE OWNERSHIP Popular among some professional and business men is the associate plan for cooperative airplane ownership. This program provides practical and economical flying by small groups where the individual needs do not justify sole ownership. Ask your Cessna dealer about group ownership.

LEARN TO FLY AS YOU TRAVEL Your Cessna dealer has the plan for learning to fly to fit your need and schedule. Popular among businessmen is the "Learn-to-fly-as-you-travel" plan. You'll be amazed at how economical it is. You can take an instructor along and actually learn to fly without interference with normal work schedules.

WORLD-WIDE SALES AND SERVICE You'll find Cessna "service stations" strategically located for your comfort and convenience. Your Cessna dealer is able to serve your every need in a friendly and competent manner. He is factory trained and equipped to provide expert and economical servicing. The "sign of the Cessna pennant" is your invitation to a new and pleasant future in the air.

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No matter what your line . . . you're almost sure to find more than a few Cessna's already at work in it! Each saving time, saving money, creating new business opportunity, eliminating travel tension — producing profit! Today, more than 25,000 leaders representing essentially every type of business are using a Cessna to leave their competitors behind — dramatic proof that whatever the job, there's a Cessna to do it . . . dependably and economically!

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AUTHORIZED
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SERVICE

The Cessna dealer displaying the factory authorized service sign represents a symbol for friendliness, hospitality and expert Cessna service featuring

factory-trained mechanics . . .

factory-approved equipment . . .

and a complete stock of genuine factory parts.

Make the most of your Cessna's usefulness by depending on the Authorized Cessna Service Centers listed for assurance that your airplane is always ready to go, always in top condition for reliability, performance and comfort.

Your Cessna is always ready to go

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The Air-Oasis Co.
3353 Lakewood Boulevard
Long Beach 8, Calif.

Aircraft Sales Company
Gregg County Airport
Longview, Texas
Meacham Field
Fort Worth, Texas

Champ's Aviation, Inc.
Municipal Airport
El Paso and Lubbock, Texas

Clinton Aviation Company
Stapleton Airfield
Denver, Colorado

Coastal Aviation, Inc.
4906 Tampa Bay Blvd.
Tampa International Airport
Tampa 3, Florida

Cruse Aviation, Inc.
International Airport
Houston, Texas

Dal-Tex Aviation, Inc.
Addison Airport
Addison, Texas (Dallas)

Executive Aircaft Company
701 Perimeter Road
Kansas City, Missouri

Lynch Flying Service, Inc.
Logan Field Box 1575
Billings, Montana

Macon Air Service, Inc.
P. O. Box 2036
Macon, Ga.

Midwestern Aero Service, Inc.
Southern Illinois Airport
Carbondale, Illinois

Ragsdale Flying Service
Municipal Airport
Austin, Texas

Skyways
Hastings and Grand Island
In Central Nebraska

Southwestern Skyways, Inc.
Municipal Airport
Santa Fe, New Mexico
and Ogden, Utah

Kenneth Starnes Aviation Service
Adams Field
Little Rock, Arkansas

Sunny South Aircraft Service, Inc.
Broward International Airport
Fort Lauderdale, Florida

Walston Aviation, Inc.
Civic Memorial Airport
East Alton, Illinois

Wings, Inc.
Wings Field
Philadelphia 18, Pa.

Yingling Aircraft, Inc.
Municipal Airport
Wichita, Kansas

One of four research lightplanes being built for the U. S. Army, this is the "Marvel," powered by a 250-hp. Allison turboprop pusher. Propeller shroud increases thrust and contains pitch and yaw control surfaces. All engine intake air is sucked through perforations in fiberglass skin atop wing for low drag and high lift through boundary layer control. Speed ranges from 35-mph. landing to 350-mph. top speed for 2,200-lb. Marvel, which has 950-lb. payload, including 2 people, 200 lbs. of research instrumentation and 390 lbs. of fuel for 900-mile range in 3 hours at 20,000 ft. Low landing speed eliminates wheels so simple skids are used.

—(Mississippi State University Sketch.)

High Performance At Low Power

THE Aerophysics Department of Mississippi State University is constructing a radically-designed two-place lightplane with a speed range of 10 to 1, topping 350 mph. and landing or taking off at only 35 mph. with an engine of only 250 hp. It is scheduled to fly by mid-1961, depending on delivery of the new Allison T63 turboprop engine, which is now being developed for a 250-hp. rating with a weight of only 125 lbs.

Named the "Marvel," it is the most advanced of four research aircraft being built for the U. S. Army in the development of short take-off and landing (STOL) characteristics. One of them, which will fly sooner than the Marvel, is a modified 2-place lightplane called the "Marvelette," with a 90-hp. Continental engine and intended to land or take-off at 35 mph. and tops 200 mph.

The University's Army projects follow years of basic research with drag reduction and lift augmentation through boundary layer control, all aimed at achieving high performance with economy of engine power through highest possible aerodynamic efficiency. In charge of this research is Dr. August Raspet, internationally-known aerodynamicist who has obtained phenomenal results with boundary layer control and drag reduction on modified conventional airplanes and sailplanes. Most recent honor bestowed on Dr. Raspet was a citation last December by the National Pilots Association in recognition of his contributions to flight efficiency. Dr.

Here's a model of the "Marvelette," which will begin static tests in July and flight tests next October with 90-hp. Continental. Built up from an Anderson-Greenwood AG-14, it will land at 35 mph. and top 200 mph. through use of boundary layer control.

—(Mississippi State University Photo.)

Raspet is head of the University's Aerophysics Department.

The Marvel will feature integration of improved lift, drag and thrust in its design — even the power plant is integrated with the boundary layer control system, providing for suction of the turbulent boundary layer through thousands of tiny holes in its lifting surfaces as an advanced means of reducing drag to a minimum without sacrificing lift. It will take off over a 50-ft. obstacle within a distance of only about 200 ft. A skid-type landing gear will be used because its lift-off and landing capabilities at low speeds eliminate the need for rolling on wheels either in landing or taking off.

The Marvel's skin will be moulded fiberglass so that surfaces of maximum smoothness can be obtained in the design's avoidance of drag and emphasis on boundary layer control.

In appearance, the design's outstanding feature is its tail-mounted power plant. Its propeller is shrouded in a duct incorporating aerodynamic control surfaces for elevator and rudder action. Lightness of the little but powerful Allison turbine allows for its tail installation without the need for propeller shafting.

Dr. Raspet says the Marvel design is aimed toward improving the lift over the classical airplane by a factor of three, improving the drag by a factor of three and increasing the thrust by a factor of two. In other words, says Dr. Raspet, "the Marvel will be an airplane with a utility and economy 3 times 3 times 2, or 18 times better than the classical airplane which we now see flying.

"What we have laid out for the Marvel should be realizable because each of the components of drag, lift and thrust has already been measured by us on airplanes in actual flight and not in tunnels or by theory alone," the aerodynamicist explains. "In other words, basic research told us what is possible and applied research told us how we can accomplish it."

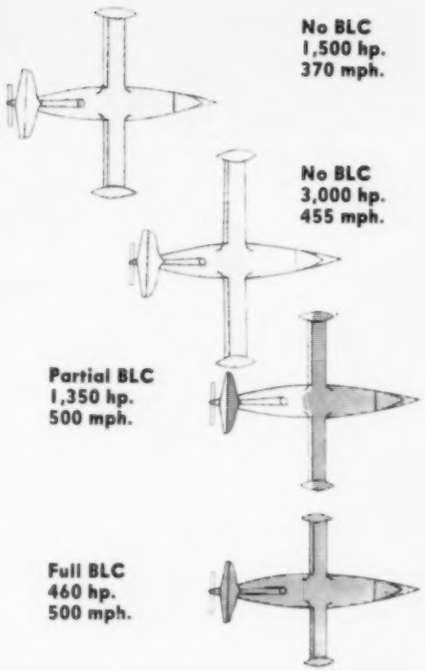
Dr. Raspet is completely dedicated to the task of accomplishing highest possible flight efficiency. Much of his work has been with sailplanes, on which he is a widely-known authority. But he has also conducted extensive flight research with conventional lightplanes modified by him and his students for drag reduction and boundary layer control. Some of the results they achieved have proved startling if not amazing.

For example, a military Twin-Bonanza was modified at Mississippi State University by "geometric boundary layer control." They smoothed the wing, covered all the rivets which were not flush-fitted, introduced fillets in the wing-root area, designed new wing tips, smoothed canopies and suppressed external antennas. Dr. Raspet says this military Twin-Bonanza is now "cruising at 190 mph. on 58% horsepower" in contrast to its original top speed of 187 mph. with full throttle.

Even more impressive is this Twin-Bonanza's improved minimum single-engine control speed. In an additional application of basic research, Dr. Raspet's group at the University improved the flow over the vertical tail by "means of smoothing and what we call geometric boundary layer control." Originally, this same airplane had a single-engine minimum control speed with the left engine windmilling of 85 mph., but the tail improvement reduced this single-engine minimum control speed to only 55 mph. and Dr. Raspet believes the modified airplane is "just as safe on one engine as it is on two — in other words, it has no violent yawing effect as long as it is flying above the stall speed."

From geometric boundary layer control, Dr. Raspet and his aides have progressed to suction as a means for controlling the boundary layer of turbulent air next to the skin — both to achieve low drag for good cruising speed and high lift for low landing speed. Suction boundary layer control was originated in 1904 in Germany by Professor Prandtl, who used a slotted cylinder in a water trough. By siphoning from inside the cylinder, he achieved an attached flow on the outside walls of the cylinder, using aluminum particles on the water to photograph the action. This was the origin of boundary layer control for high lift.

One of Raspet's most recent examples of applied suction boundary layer control is an Army L-19. Its



Comparison of four corporate transport design proposals, all with 2,400-lb. payload, 2,700-mile range and wing loading of 60 lbs. per sq. ft. This charts how boundary layer control (BLC) slashes power required for high speed.
—(Mississippi State University Data.)

This Anderson-Greenwood AG-14 was one of numerous test vehicles on which Dr. Gus Raspet developed suction boundary layer control. Note pump on wing, propeller shroud. This duct increased the propeller's thrust from 265 lbs. to 580 lbs. Static tests only were conducted with the rig as pictured. —(Mississippi State University Photo.)

This is the Army Twin-Bonanza whose top speed was 187 mph. before aerodynamic cleanup as compared to 190-mph. cruise at 58% power afterwards. More importantly, however, minimum single-engine control speed was reduced from 84 mph. to only 55 mph. Note low-drag Horner wing tip. Dorsal fin was removed, wing, tail and canopy surfaces were smoothed, antennas suppressed and wing-fuselage fillets added.

(Mississippi State University Photo.)

entire upper wing surface was perforated with small holes. Through them, air from the stagnant boundary layer is sucked into the wing and then discharged through a trough.

"Simply by stealing 10 horsepower for suction from the engine of this airplane, we were able to raise its lift coefficient from 2.2 to 4.7," Doc Raspet reports. "This permits the L-19 to land at 35 mph. and take off at 31 mph., the additional lift being due to the propeller slipstream."

The L-19 also was equipped by the University group with low-drag wingtips of the Horner design, developed in Germany. This design was first used in the U. S. on a sailplane, the famous RJ-5 which was flown by Dick Johnson in 1951 to break the world distance record held for years by a Russian. Dr. Raspet said the Horner tip has since been applied to the Twin-Bonanza, a Bonanza, a Navion and numerous sailplanes in his applied research programs. "Our research has clearly shown that the drag can be decreased and the lift increased and stalling properties of the wing improved by the use of this tip," Dr. Raspet says.

It requires about 160,000 small holes to be drilled in the upper wing surface of an airplane such as the L-19 to achieve the high-lift boundary layer control, he says.

Keeping the holes free of clogging requires care but presents no extreme difficulty. A perforated Cub accumulated dust for a year. Flown before cleaning, the dust's effects raised the stall speed only 1 mph. Flights through heavy rains proved only a small amount of water was sucked through the holes — no problem.

Necessity being the mother of invention, Raspet's group has come up with an ingenious device which they call their "lift reserve indicator."

"To utilize the full lift coefficient, which is achieved by our boundary layer control, we must know the state of the boundary layer on the airfoil, especially during landing and take-off," Raspet explained. "So we designed and developed our lift reserve indicator, which listens to the boundary layer by means of a small probe and converts the pressure fluctuations into electrical oscillations. These are amplified and fed into the radio circuit for either headphones or loudspeaker sound. The listening pilot thus hears a signal which is proportional to the lift reserve available at all times. If the aircraft is very far away from stall, all he hears is an occasional burst of turbulent noise through the radio circuit. But if he is within 5% of the stall, the sound will be a continuous turbulent rushing noise. This sound is uncomfortable in his ears and to get rid of it he simply pushes forward on the wheel. This instrument is also useful should the pilot become disoriented in an unusual attitude. If the circuit roars in his ears, he knows he must lower the nose or add power for recovery."

Raspet's applied research in achieving greater thrust from small engines has developed a ducted propeller installation. Tried as a modification on a 2-place Anderson-Greenwood AG-14 pusher, it features an efficient shroud around the propeller and the propeller itself is twisted to utilize the increased airflow provided by the shroud, or duct. By this means the AG-14's thrust was increased from 265 lbs. to 580 lbs., being more than doubled.

From this modification, the Mississippi group progressed to a more extensive alteration of the AG-14 in which the original tail group is replaced by installing the ducted propeller in the stern and incorporating yaw and pitch controls in the duct around the prop. "This airplane we call our Marvelette," says Dr. Raspet. "It will be capable of flying safely at 35 mph. for landing and taking off. It will also be capable of topping 200 mph., using a 90-hp. engine and carrying 2 people."

It is from the Marvelette that the group's ultimate in flight efficiency is being developed — the completely new Marvel with its 250-hp. Allison turboprop and its ability to fly 10 times faster than its landing speed, topping 350 mph.

Pointing to past accomplishments in both basic and applied research in lightplane improvements, avoiding the luxury of adding more horsepower through the use of larger engines, Dr. Raspet explains that horsepower alone can not push the lightplane through brute force into new realms of greater usefulness.

"All of our problems in aerodynamics result from the simple fact that air is viscous and we must therefore concentrate on the fullest possible understanding of the viscous properties of air in motion before we can begin to take advantage of the greatest opportunities for improving the lightplane's performance through efficiency," he explains. "In our long and extensive research, our studies of viscous flow became widely divergent in that they tended to encompass more and more problems in more and more fields. Eventually, however, we acquired sufficient understanding of these problems to focus their solutions through lightplane modifications into a completely new aircraft design, our Marvel.

"In addition to its speed range of 10 to 1, its excellent STOL capabilities and its extraordinary flight efficiency with economy of horsepower, the Marvel demonstrates that basic research around the small airplane is still a very fascinating field of endeavor — even for long-haired engineers and physicists, who might otherwise be attracted to space flight. What the Marvel offers is quite within reason of being realized. I hope the aviation business will be favorably influenced by developments such as these.

"When basic research produces an airplane such as the Marvel, we can look forward to improved economy, improved usefulness and increased sales of lightplanes. I am convinced that the process of airplane development, conducted with basic research, is a straightforward process without any gamble of chances."

Thus it appears that years of experimentation by Dr. Raspet and his group at Mississippi State University are on the verge of yielding accomplishments of far-reaching significance to aviation.

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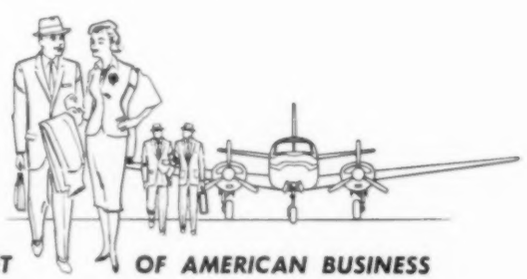

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BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

This Sikorsky S-55 was flown with stub wings to provide some of the lift with rotors partially unloaded for higher speeds. Sikorsky's compound helicopter design will also provide supplementary engines for forward thrust and speeds up to 300 mph.

—(Sikorsky Photo.)

Helicopter Progress Developments

WHILE significant advances will be accomplished by new helicopters recently placed into production by Sikorsky Aircraft Division of United Aircraft Corporation, its helicopter research activities emphasize three major advancements in rotary-wing development. These are (1) a giant utility crane helicopter with four turbines and a 40-ton payload, (2) a compound wing-plus-rotor helicopter for higher speeds up to 300 mph., and (3) a VTOL delta-wing convertiplane with retractable jet-tip rotor which would combine vertical take-offs and landings with supersonic speeds.

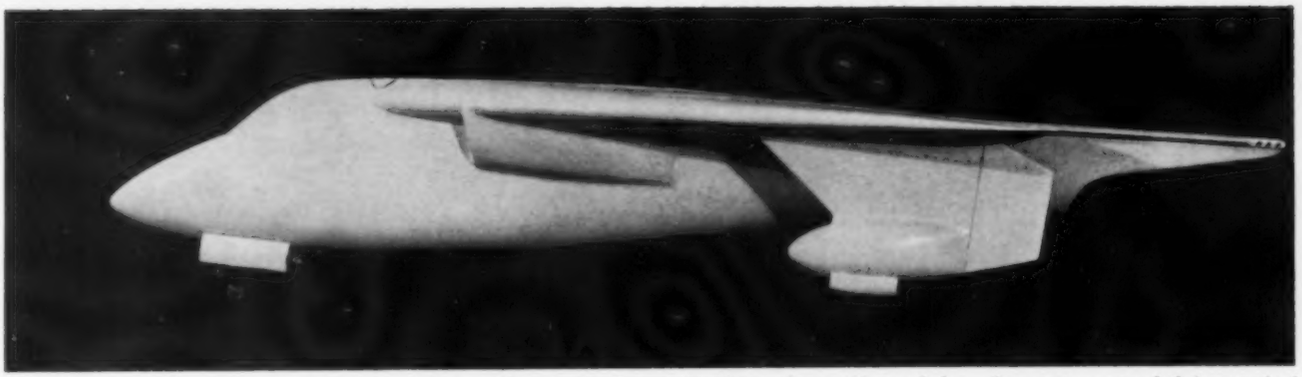
In the compound helicopter development, flight tests have been conducted with an S-55 on which stub wings were used to provide some of the lift in forward flight while partially unloading the rotor as a means of attaining higher speeds. Wind tunnel tests using models are advancing this development with the addition of supplementary power plants for forward propulsion. Turboprop pods on the wing will probably be used in the final design. In addition to forward thrust, these would also provide additional directional control. The goal is a forward speed capability up to about 300 mph., heretofore unattainable with helicopters. Thus the military helicopter transport's cross-country capabilities would be greatly extended. Sikorsky's compound helicopter is being designed as a military assault transport.

For combining supersonic speeds with helicopter VTOL capabilities, Sikorsky believes it may have solved this requirement with the design of its S-57 convertiplane. Once shelved as a military project, discussion of the S-57's capabilities was revived last month in United Aircraft's annual pictorial report covering corporation projects.

The basic approach taken in the S-57 design was to make a true conversion from the helicopter configuration to a fixed-wing configuration in flight. The S-57 would take off as a helicopter and then, for high-speed requirements, the entire rotor system

Flying minesweeper role was performed by the Sikorsky S-60 Skycrane in demonstrations for the Navy at Panama City, Florida. It is shown fitted with a special pod and winch, towing lightweight minesweeping gear which it carried, lowered, towed and retrieved to demonstrate its self-sufficiency.

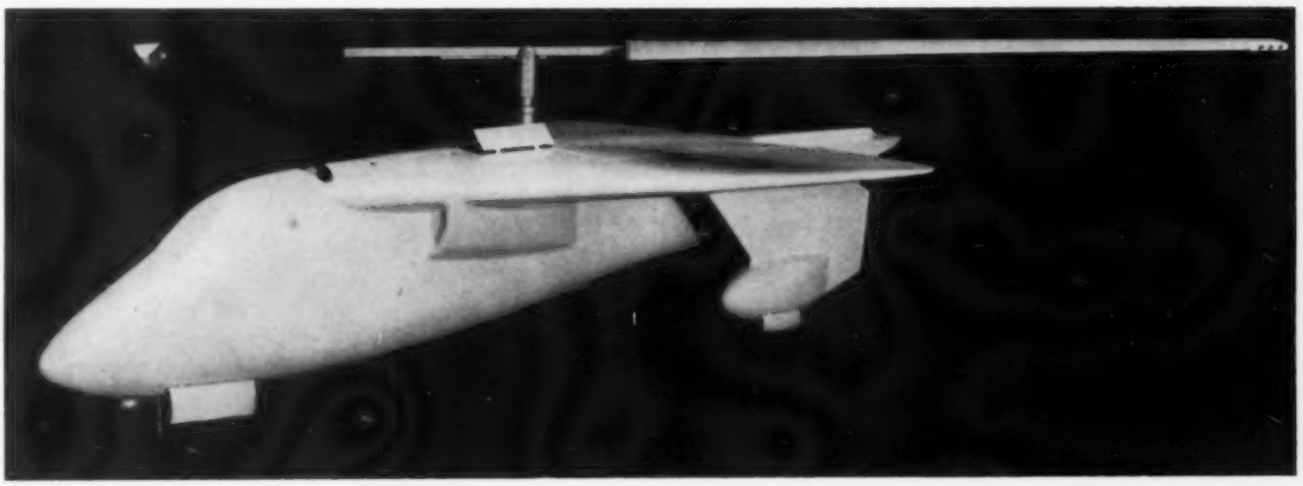
—(Sikorsky Photo.)

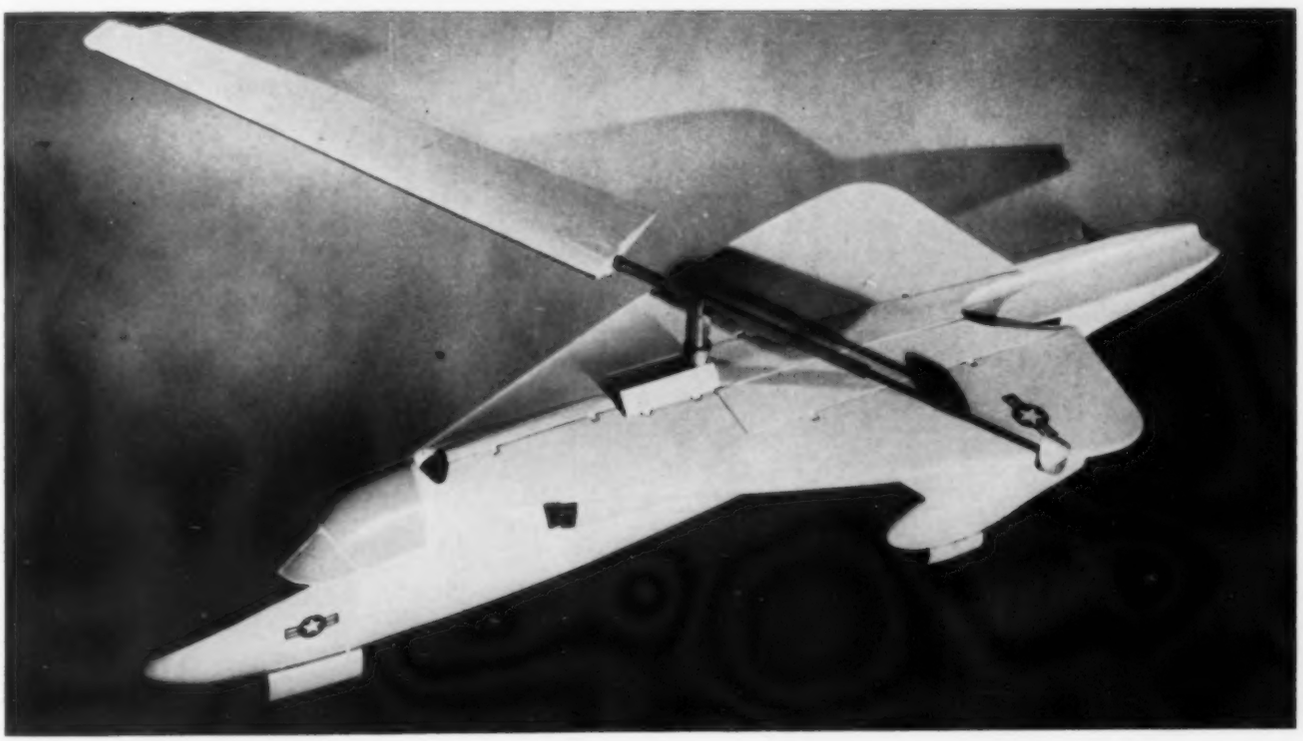


Sikorsky model shows supersonic convertiplane with retracted rotor in photo above. Photos below show rotor extended for vertical landing and take-off.

would be retracted and stowed within the contours of the airframe to present a streamlined fixed-wing jet aircraft. This concept provides operational ease by use of a single set of flight controls and powerplants for both vertical and high-speed operations. Moreover, the S-57 would be suited for a wide variety of missions, including high-speed reconnaissance and interception, since it could operate from almost any kind of terrain.

Rotor is powered by tip jet using compressed air bled from jet engine. Rotor of S-57 is unloaded for airplane flight, then retracted into airframe.





NEW FOUR-PLACE HILLER 12E-4, first four-place helicopter to be offered by Hiller Aircraft Corp., is shown above as it was pictured in the firm's annual report last month. It will be in production during 1960 and Hiller will also offer a 4-place cabin conversion kit for the standard 3-place Model 12E. No details were given. Stanley Hiller expects a 75% increase in his firm's commercial helicopter business during 1960 and a 10-fold sales growth for the general helicopter business in the U. S. during the Soaring Sixties.

—(Hiller Photo.)

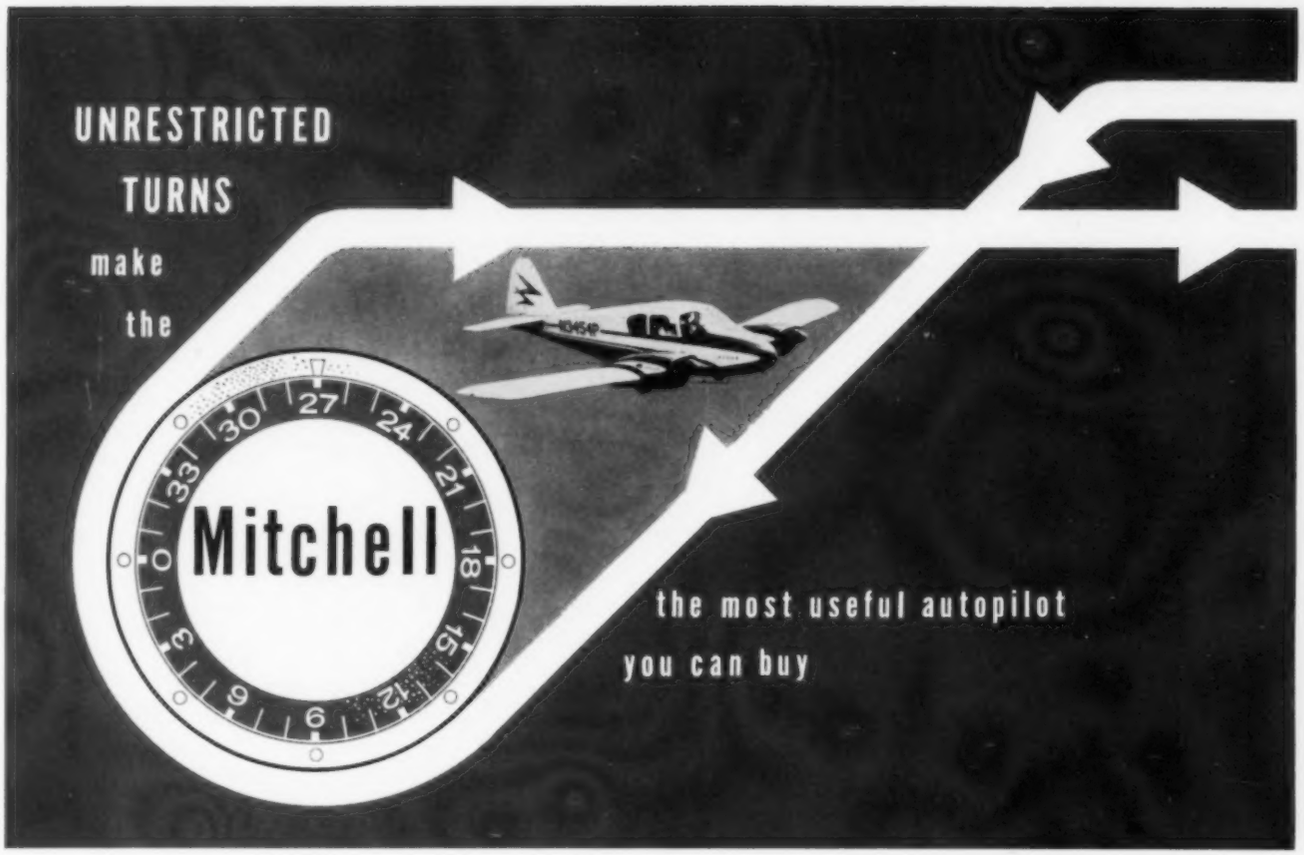
In its development of flying crane helicopters, Sikorsky is conducting demonstrations with the S-60, powered by two piston engines, and its new production-model twin-turbine S-64 crane will have a payload of 8 to 12 tons. Its advance planners, however, are busy with a much larger crane far exceeding the size of any existing direct-lift aircraft. This giant will be powered by four large turbines, will lift and transport a 40-ton payload and will have a cruising radius of about 116 miles. A wide area of usefulness is seen for it in both military and commercial operations. It could establish and supply remote installations, assist in the construction of bridges and towers and carry special cargos such as command posts, hospital units and missiles and their launchers. It could resupply submarines, load and unload ships and support assault operations. Its concentration of turbine power would enable the giant crane to exert a towing force of 180,000 lbs., equivalent to that of three deepwater tugboats.

HELICOPTER CAPTURES OF AN ESCAPED CONVICT IN MISSOURI AND A WETBACK IN TEXAS were reported last month by Bell Helicopter Corp. Shown below are Missouri Highway Patrol officers with an escaped convict, Walter Jones, who was captured with their new Bell 47G-2. In Texas on the Mexican border, Bell Regional Sales Manager Bert Ratliff, flying a Border Patrol officer, spotted a Mexican cutting wood on the U. S. side of the Rio Grande River, ostensibly to build a fire and dry his clothes. Landing within 20 yards of the wetback, the patrol officer captured the alien after he had swung the axe at the officer. Later the same day the Bell 47G-2 intercepted three wetbacks on horses, knocked one off his mount and caused the horse to throw the third alien so that he was captured.

—(Bell Photo.)

WORLD'S LARGEST COPTER OPERATOR, Okanagan Helicopters of Vancouver, Canada, has bought its first two Hiller 12E utility copters for operations in high mountains. G. W. McPherson, president of Okanagan, is show below at right with A. W. B. Vincent, Hiller Aircraft vice president. Okanagan operates 60 helicopters.

—(Hiller Photo.)



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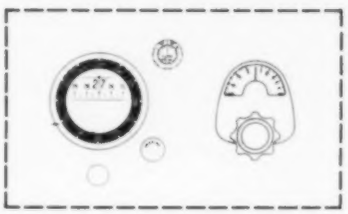
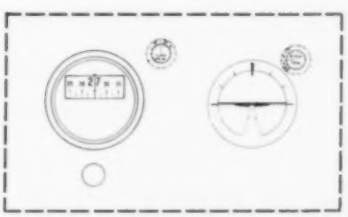


For the pilot who wants the ultimate in an automatic pilot, Mitchell now offers two new optional features: **Automatic Heading Selector** that enables you to dial the exact heading you wish to fly; **Automatic Altitude Selector** that allows you to dial your altitude, either before or after engaging the autopilot. New heading and altitude selectors may be added to any transistorized Mitchell already in service.



New Mitchell 2-control model is now available for almost all single-engine, 4-place aircraft for only **$1,095** (with Automatic Heading Selector **$1,480**). The 2-Control Mitchell has all the features of the 3-Control model except pitch control, which can be added at any time.

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Here's a typical "airplane show" hangar scene in Colorado as setup by Cessna dealers under Clinton Aviation. Note pennants and signs, including a registration desk for prospective flight students. —(Clinton Aviation Photo.)

Small-Town Market Penetration

By GEORGE E. HADDAWAY

CLINTON Aviation of Denver, one of the nation's top Cessna distributors, has developed an effective and economical formula for complete market penetration of their territory. Their formula is especially productive in the booming Colorado area, which boasts very few large metropolitan areas. Hard economic facts require Clinton and its dealers to work the rural and small town market. Complete dependence on the city carriage trade would be economic suicide.

Clinton's formula is a simple *airplane* show. It's not an air show. It's a down-to-earth static display of the new models with a few gimmicks thrown in to get and hold the crowd's interest. It is not tied in with an auto show, a home show, horse show or a sports show. It stands on its own feet and has been drawing more than satisfactory crowds.

Last month in Fort Collins, Colorado, we watched Grant Robertson and Nick Nichols of Clinton Aviation engineer one of these airplane shows. Clinton doesn't even have a dealer in Fort Collins. But the local operator, Don Waldvogel, asked Clinton to put on a show for him at the Fort Collins Airport. Don, an ex-Marine pilot from Chicago, has been in the airport service operation business for less than a year and wanted to stir up some local interest in the airport and the merchandise he has for sale. He had heard about the same kind of show being put on for the operator at Aspen, Colorado, even though he wasn't a Cessna dealer.

Grant Robertson told us there are two general classifications of people who will come out to see a static display of airplanes. The first is the general public. "A lot of us who have been around airplanes for a long time have forgotten that the airplane still has a lot of glamor and attraction to people who have never been in one, or even touched one, or sat in an airplane on the ground," Robertson says.

The second category of people who come to the airplane shows are pilots. The rural and small town pilots like to look at new models and enjoy the opportunity of old-fashioned hangar-flying with other pilots who come to the airport to see the display.

"Look at that family crawling into the Skylane," we remarked with warning inside the Fort Collins hangar. "Yeah, man," Grant replied, "that's what we brought the nine models in here for. We do lock up the 310 but all the rest are wide open. We've never had one airplane damaged or permanently dirtied in any way. The day is past when you build fences and put up don't-touch-the-airplanes signs around airports," he added.

"Can you sell airplanes at these shows?" we asked.

"Not exactly," Grant replied. "The purpose of these shows is to acquaint the general public with modern airplanes and provide easy access to the new models for the pilots in the community. We're mainly planting seed. We've sold about 11 airplanes at eight

Newspaper ads make it plain that this is an "airplane" show, emphasizing static displays of new airplanes and movies devoted to the advantages of flying.

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This trailer is sound-equipped for advance advertising purposes. It is pulled through town several days before the airplane show, drumming up public interest for the week-end airport activity. —(Clinton Aviation Photo.)

shows this year but the sales development work was all done previously. We don't even give demonstration rides during the Saturday and Sunday static display. If any of the boys here run into a real prospect, demonstration rides are made by appointment during the coming week. The only registration we have is over by the Cessna 150 model where students can sign up for flight instruction. I plan to sell an airplane at five o'clock this evening, but the sales work was done previously."

Robertson is an old hand at the airplane marketing business. Back in 1947 when the slump hit the lightplane business during the "order-taking" days, Clinton Aviation used to have what they called "ranch shows." With a little promotional effort in a small town, they would get farmers and ranchers out to the airport and take them for a flight over their property. "This was a good start," Grant told us, "but it didn't go far enough and we wore out a lot of airplanes taking people for rides. Our new formula proves that aviation is attractive enough for an airplane show on the ground. Our present deal is like the Ringling Brothers Circus on a small scale. Sunday evening, after the crowds dwindle down, we gather up our pennants, signs, movie film and Cessna backdrop drapes, pack them into the airplane and in thirty minutes we're gone!"

The static displays have been attracting several thousand people from each town. A recent show at La Junta in Southeastern Colorado attracted 3,000 people out of a total population of 8,000. Many people called the operator on the phone to ask for directions to the airport. They not only didn't know the way, they didn't even know the town had an airport!

"You never know what these individuals milling about have in their mind or pocketbook," Grant observed. "Why are they here? Why did they pack up the whole family and come out here to look? Over there is a man who has been out all day and says he's coming out again tomorrow with more people. Both Don Waldvogel and I honestly believe we'll end up selling him a Cessna one of these days."

Grant Robertson's ingredients for an airplane show are quite simple. Here they are:

1. Decorate the show area with pennants and off-the-shelf decoration materials. Hang up a lot of signs that answer most of the questions.

2. Provide some kind of music. At the Fort Collins show they had hired an electric organ and soft background music made for a pleasant atmosphere. Hi-fi recordings have been employed at other shows.

3. Provide some kind of refreshments. Usually coffee, which the people serve themselves. A nationally-famous coffee brand salesman provided the coffee free at Fort Collins. At the Aspen show the Carnation people served free ice cream cones.

4. Locate a registration table near the 150 to sign up prospective students. Robertson doesn't believe it necessary for everyone to register because a general public list is no good.

5. Rig up a simple "theater" for continuous showing of airplane films. Robertson is showing two currently-popular Cessna factory films. One, entitled "Doubting Thomas," runs for 15 minutes and dramatizes a young businessman convincing a salesman friend, who is "beat up" with auto travel, to learn to fly and buy an airplane. This film doesn't mention Cessna. The second film, entitled "Nine Ways To Leave Your Competition Behind," runs for 35 minutes and details each one of the nine new Cessna models for 1960.

6. Advance publicity and promotion is fairly simple. Clinton's people come into the town two weeks in advance. The local operator or dealer buys advertising in the local papers with mats and copy furnished by Clinton. Radio spots are carried for the two weeks previous to the show weekend and if TV is available the advance men with the local operator try to encourage on-the-spot radio and TV coverage.

Costs of putting on an airplane show vary from a couple hundred dollars to a couple thousand, according to what the dealer or operator wants to spend and according to the size of the town. Advertising is the big item. In one town an operator got a twenty-five minute show plus thirty-six spot announcements on a local TV station for only $136. Another wide variable in cost is what the operator does in the way of music and refreshments.

It takes about eight people, including the operator, his wife, mechanics, instructors or volunteer students to handle the crowds. Most of the helpers at Fort Collins were students who got some free flying time for their efforts.

The operator at Fort Collins, Don Waldvogel, believes that the show will hasten the day when he can become a full-fledged Cessna dealer under Clinton instead of only a bird dog.

The Cessna factory's formula is for larger towns and could be relatively costly, what with fancy music, expensive decor and buffet luncheons for bankers, civic leaders and other big town VIP's. Cessna is now adopting the Clinton formula in a couple of areas where they do not have distribution and encourages other distributors to apply the Clinton formula to their own smaller towns, where diversionary entertainment or special attractions are not necessary. The new airplanes are the single, fundamental attraction.

The dealers and operators who have put on the airplane shows with Clinton's help are already planning for better shows of the new models next year. Enough sales prospects have been uncovered to make them pay off for the dealers and the added prestige it brings to the operator and the airport are additional tangible benefits.

It's a simple formula. And what works for Cessna should certainly work for the other brands. It's a lot of work and at the end of the two-day weekend show, everyone is bushed. But the final results are well worth the money, sweat, energy and sore feet.

AIR TRAFFIC CONTROL

(Continued from page 28)

of research and development. It is indeed encouraging to note that Congress is now annually appropriating 40 to 50 times as much money as it did five years ago for air traffic control and air navigation research. We are heartened by the concerted effort being made by the Federal Aviation Agency in this field. A note of caution is in order, however. The recommendations of the Curtis Committee and the programs of the Airways Modernization Board each tended to oversimplify the problems of evolution or transition from the existing system. These problems are, to say the least, formidable. The basis for a sound attack on these problems must be a clear and realistic statement of valid requirements. It is the direct responsibility of all interested parties to see that the research groups are furnished with such requirements. No groups are more vitally concerned with this process than are the National Business Aircraft Association and the Air Traffic Control Association — pilots who daily fly the system and controllers who work round the clock insuring safe and orderly use of the airspace. We must also be constantly aware that requirements will change, and researchers must avoid becoming so enamored of their objectives as stated in budget justifications, as to fail to recognize the need to reorient a program, or shift priority, as the case may be. Starting with valid requirements, it has been proven that analysis, systems engineering, and simulation are valuable tools indeed — but these techniques and devices should never become ends in themselves. Unless these tools are applied to the requirements generated by those who know the problem best, and unless these tools are used by researchers who possess more than a casual curiosity in this unique problem of air traffic control, we will not live up to the expectations embodied in the Federal Aviation Act of 1958.

All-Weather Landing System

One of the most promising areas for improvement in the air traffic control system is the development of an all-weather landing system. An aggressive program is under way within the Federal Aviation Agency to solve this problem. A great deal of experience has already been gained by the military in similar efforts. The individual pilot generally views the matter of forecast weather minima at his destination in terms of his own particular flight — though he can't help but be aware of the fact that if weather exists, he can certainly anticipate congestion, and

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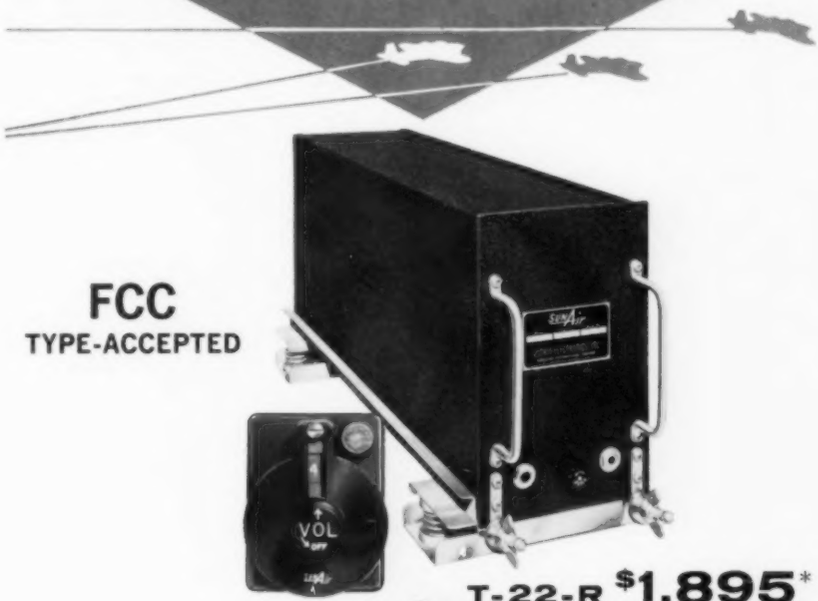

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probably delays. However, he evaluates the forecast, and takes his chances. If the forecast holds, he generally is able to complete his flight — if the field closes, he diverts to an alternate. The controller's problem is somewhat more complex. This can best be illustrated by a consideration of the fact that a change in ceiling of only 100 feet, or a change in visibility of as little as a quarter of a mile, can have a drastic effect upon the acceptance rate of an airport. If the change is downward, it can and does often stop all operations altogether. When this happens, there is a hectic but orderly series of negotiations with each pilot (and there may be a hundred or more) as to whether he elects to wait for improvement in the weather, or proceed to an alternate airport. The effects of such events are seldom confined to one terminal area, but have reprecussions affecting the operation of thousands of aircraft along the airways and in the terminal areas over a great portion of our country. A vast improvement in the orderliness and traffic-handling capacity of the system would be made through the introduction of an all-weather landing system. It goes without saying that it would also have a very beneficial economic effect upon the operators of the aircraft concerned. Although the implementation of an all-weather landing system would partially inure the air traffic control system to the effects of weather, it would not obviate the need to, as someone once put it, "do something about the weather."

The Federal Aviation Agency, in conjunction with the Department of Defense and the Weather Bureau, has undertaken an extensive research and development program concerned with the assembly, analysis, distribution and display of aviation weather data. The magnitude of this program far overshadows the effort being expended on landing systems. Pilots have expressed some concern on this score, even wondering if our economy could afford to maintain and operate the weather system envisioned by this inter-agency effort. Pilots and their organizations have a direct responsibility for the continuing evaluation of programs such as these, and for the submission of their requirements in terms of recommendations as to the relative emphasis to be placed on various projects.

Data Handling By Computers

The problem of data handling in the air traffic control system is one of the most vexing, while at the same time challenging, which we face today. The general public tends to think of air traffic control in terms of the man in the tower, issuing clearances to land or take off — and seldom gains an appreciation of the monumental task of controlling traffic enroute between terminals. You are aware of the tremendous amount of clerical functions that must be performed by controllers incidental to their main function of controlling traffic. Estimates on the amount of time spent by controllers in the assembly, recording and transmission of routine data have ranged as high as 50 per cent. An encouraging step forward has been taken in the application of electronic computers to this data processing task. Computers are now in operation in six Air Route Traffic Control Centers. Similar computers are planned for additional centers during this and future years. Benefits of this limited application of automation to the data processing problem are already being realized. Not only is the operation of the air traffic control system directly improved, but the practical day-to-day experience being gained by controllers is an invaluable and continuing source of data in determining the firm requirements for more elaborate data processing systems. That data processing is one of the most critical problems in air traffic control is well recognized. The Curtis Committee endorsed the efforts then already under way by the CAA in this matter. The Airways Modernization Board designated data processing as its major project, and this emphasis has been continued by the Federal Aviation Agency.

The FAA project, referred to as "Data Processing Central," calls for a more sophisticated computer operation, capable of on-line operation with other centers and towers, and performing many more of the routine data processing functions for the controller. Functions such as: updating stored information, revising flight progress strips, searching for conflicts and displaying these to the controller along with proposed solutions; keeping a running account of demand versus acceptance rate, thus introducing regularity into the flow of traffic; utilizing tracking techniques in the terminal area for both inbound and outbound aircraft to effect precise spacing of aircraft in terms of fractions of a minute; and

Piggy-Back Space Airliner

Bell Aircraft Corp. said last month the firm had received a $1,400,000 Air Force contract to develop production methods for an insulated double-wall type of cooled aircraft structure enabling space vehicles to re-enter the earth's atmosphere without burning up from friction. A liquid would be circulated between the double walls and the heat it absorbs would be transferred to an expendable fluid such as water for discharge from the vehicle as steam. Shortly after this announcement, Leston Faneuf, Bell chairman, released these sketches of his ideas of a 30-passenger, 160,000-lb. space airliner powered by a 165,000-lb.-thrust liquid rocket engine and a small jet engine. It would be boosted to a height of 20 miles by a piloted carrier and there separate for acceleration under its own power for about 4 minutes, reaching 15,000-mph. speeds and 40-mile altitudes and gliding most of its 5,000-mile range — 64 minutes from Los Angeles to Paris, for example. The jet engine would power it to a landing. Passengers would be nearly weightless during its high-speed glide. Developed cost estimate: $1 billion. Cost of fleet of 40 transports and 20 carriers for a 10-city network: Over $500 million.

many other features. The originally announced schedule for the appearance of this equipment called for implementation in the New York area, ready for operation, by January 1, 1963. This date has recently been reaffirmed by the Federal Aviation Agency's Bureau of Research and Development. This means that the FAA has less than three years to effect the procurement of the actual hardware for installation in the various traffic control facilities in the New York area, in order to allow sufficient time for the necessary training of personnel and the development of the necessary air traffic control procedures.

Concurrent with this development program, there is an urgent requirement to continue the refinements to the computer systems already in operation. These projects are non-competitive, and the type of computer operation now being conducted in the New York and Washington Centers may very well suffice for less busy centers during most of the next decade. It is apparent that the operation at certain of the ARTC centers would not justify the expense of the more elaborate data processing system now under development.

Area Traffic Control

At the same time, the research and development must move ahead in development of the next system of air traffic control. There is an increasing sentiment that the present airway structure may soon be a serious deterrent to the further expansion of air transportation. The FAA has already announced plans for a test of area traffic control in the Detroit-Chicago-Indianapolis triangle. This experiment will be watched with great interest, but a negative result of this particular test should in no way discourage further efforts. It is possible that the existing environment of navigational aids, data gathering and data display, designed for an airway type of control, may not represent the optimum environment for a true test of the concept of area traffic control. Most vital as a research and development item is the exploration of new techniques for the display of flight data to the controller. This requirement for improved displays will assume greater significance throughout the next decade.

A condensed forecast of the future of air traffic control during the next decade must start with a clear statement as to the role of the air traffic controller. The next ten years will see a vast increase in the responsibilities of the controller. The introduction of automation will not decrease the reliance of the system upon the human, but will, in fact, enhance it. Automation, by relieving the man of the clerical burden, also frees him to spend a greater portion of his time in the decision-making capacity. Already a

RONTEL FOR PILOTS, a 20-unit hostelry has been opened at Tucson Municipal Airport by Bill and Bertha Curtis, well-known as former operators of the famed Blue Horizon at Clear Lake, Iowa. Bob Schmidt's Tucson Airport Authority registered the "RONtel" name as being distinctive for lodging pilots.

—(Tucson Airport Auhority Photo.)

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vital part of the aviation industry, air traffic control is rapidly becoming the very life blood of an important segment of our economy — and its importance to national defense goes without saying. These facts are well testified to by the concern expressed in Congress and throughout the aviation community. It is clear that a suitable environment must be provided if the air traffic control service is to be able to maintain its fine safety record, and at the same time absorb the fantastic increases in air traffic during the next decade. Congress has indicated that it will act to provide this environment, upon receipt of recommendations called for in the Federal Aviation Act of 1958.

More Regimentation Of Traffic

During the next ten years there is bound to be a greater regimentation of air traffic, to provide the best utilization of airspace to the maximum number of users. This has been the case in every other form of transportation, and it is highly unlikely that aviation will be the exception. I wish to emphasize at this point that the foregoing statement does not imply positive control of all airspace. It is not required, and is certainly not desired. General aviation will not be legislated out of the air. It is reasonable to expect, however, that some restrictions will be applied. I predict that such restrictions will be as readily accepted as with the requirement for two-way radio in certain terminal areas. This prediction is based upon the assumption that the voice of general aviation will continue to be heard in the thoughtful deliberations upon the equitable allocation of our airspace.

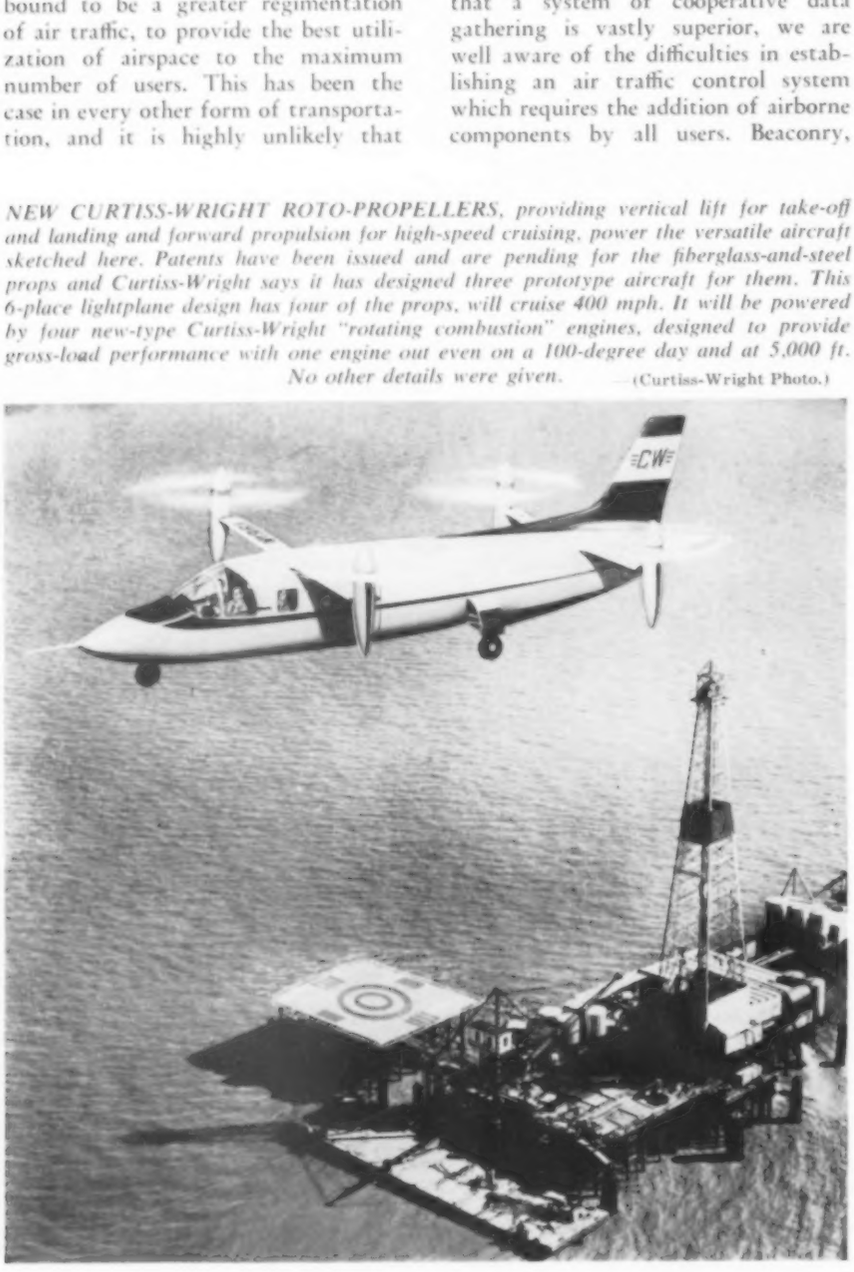
There will be an increasing reliance upon radar during most of this decade as a basic method of data gathering. Though our experimentation tells us that a system of cooperative data gathering is vastly superior, we are well aware of the difficulties in establishing an air traffic control system which requires the addition of airborne components by all users. Beaconry, distance measuring equipment, datalinks; any addition to the cockpit which carries a penalty in terms of size, weight, power, or cost will be slow to be accepted. Acceptance will come from confidence — confidence that the recommended system is the result of realistic requirements and painstaking development and evaluation.

One of the unknown quantities facing air traffic control during the next decade is SAGE. It has been suggested that parts of the SAGE system have a direct application to air traffic control. Certainly there are some very good reasons why we should not duplicate our efforts in terms of surveillance of the airspace, or the processing of position data, when it can be shown that facilities can be shared. As more practical experience is gained with the SAGE system, and particularly as firm ATC operational requirements are matched against the proven capabilities of SAGE, we will determine the extent to which SAGE equipment and techniques can be helpful in solving the ATC problem.

There are many other areas which will have distinct impacts upon the progress of air traffic control during the coming ten years. We should see significant improvement in air/ground or pilot/controller communications — automation of many of the routine communications, and resultant reduction in the amount of attention demanding voice transmissions. It is a certainty that helicopter traffic will increase at a tremendous rate. Whether this traffic can be kept entirely free from conventional aircraft traffic, or just how it will be blended into the over-all traffic pattern, will be increasingly difficult to resolve. In addition to the hope for an all-weather landing system previously mentioned, the ability to use parallel runways simultaneously under any weather conditions will have an extremely beneficial effect on the system.

There are other problems that could be mentioned. I am sure that, in addition, we will encounter areas of difficulty beyond our present imagination. Mach 3 transports will surely be in the system, and prior to the end of the decade we will no doubt see an extension of the responsibilities of air traffic control into the fringes of space. These problems will be faced, and will be solved in a positive fashion through the determined and resourceful partnership of the two groups having the largest stakes in the matter — the pilots, who will still be flying the aircraft; and the controllers, who will still be making the air traffic control decisions.

NEW CURTISS-WRIGHT ROTO-PROPELLERS, providing vertical lift for take-off and landing and forward propulsion for high-speed cruising, power the versatile aircraft sketched here. Patents have been issued and are pending for the fiberglass-and-steel props and Curtiss-Wright says it has designed three prototype aircraft for them. This 6-place lightplane design has four of the props, will cruise 400 mph. It will be powered by four new-type Curtiss-Wright "rotating combustion" engines, designed to provide gross-load performance with one engine out even on a 100-degree day and at 5,000 ft. No other details were given. —(Curtiss-Wright Photo.)



THE 500TH BEECH SUPER 18 produced by Beech Aircraft has been delivered to Koss Construction Co., Des Moines, through Elliott Flying Service, Beech distributor. Pilot Jim Dolezal of Koss Construction is shown with the new Super G18.

—(Beech Photo.)

AIR REPORT

(Continued from page 8)

cial sales manager, who resigned recently. The announcement was made by W. F. Sauers, president of ARC, which is a Cessna subsidiary.

WHY NOT FLYING DENTISTS? Dental professionals who fly and would like to join an organization for flying dentists should get in touch with Dr. Bill Stevenson, 610 West 8th Street, Amarillo, Texas (there are already associations formed by Flying Farmers, Flying Physicians, Flying Lawyers and Flying Realtors). On Saturday, June 4, all flying dentists are invited to fly-in at Tradewind Airport, Amarillo, for an organization meeting on June 5. Farrell Manor, Box 81, Amarillo, is the hotel to write for reservations.

GRUMMAN AIRCRAFT has a new contract for 42 AO-1 Army Mohawk twin-turboprop observation aircraft, with 1,050-hp. Lycoming T-53-53 turbines and Hamilton-Standard props being furnished by the government. The short-take-off-and-landing Mohawk has a 230-mph. cruise speed at 5,000 ft., four hours of fuel with 256 gals. carried internally and 300 gals. in wing-mounted drop tanks, 12,000-13,000 maximum gross weight and 306-320-mph. top speed. The Grumman contract is administered by the Navy for the Army.

ZOTACK CONVERSION FOR CESSNA 172, replacing 145-hp. Continental engine with 180-hp. Lycoming, has been certificated by FAA and is said to give the Model 172 cruise speed of 138 mph. It is marketed by Bridgeport Flight Service, Stratford, Conn.

ONE-DAY FLIGHT SAFETY CLINICS, featuring experts on air traffic control, radio aids, airplane airworthiness and meteorology, will be sponsored throughout the state by the Texas Aeronautics Commission this spring. Pilots are urged to attend the free clinics. . . . **TWELVE-WEEK GROUND SAFETY REFRESHER COURSES FOR PILOTS** are being conducted throughout New York by the N. Y. State Commerce Department. Free of charge, the courses offer refresher instruction in navigation, meteorology, civil air regulations, radio instruments and aircraft operation.

SUNNY SOUTH AIRCRAFT SERVICE, Cessna distributor at Ft. Lauderdale, Florida, has named Eugene P. Bright sales manager and assistant general manager.

NEW HUGHES TWO-PLACE HELICOPTER, the $22,500 Model 269-A, will go into production this summer with 30 orders on hand and plans for annual production of 300 or more machines.

ED LUND has joined California Airmotive Corp., North Hollywood, as general manager. . . . Galveston, Texas, has named its municipal airport as **SCHOLES FIELD** in honor of Bob Scholes, veteran airman and airport manager who has directed the field for over a quarter of a century.

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MUNICIPAL AIRPORT • TULSA 1, OKLAHOMA

FIVE NEW GRUMMAN GULFSTREAMS were in the hangar last month at Atlantic Aviation in Wilmington, Delaware, indicating stepped up turboprop activity in executive flying. One was ready for delivery, two nearing completion, and two for periodic maintenance. Atlantic Aviation has sold 17 Gulfstreams and has increased manpower 50% to handle the growing volume of Gulfstream work.

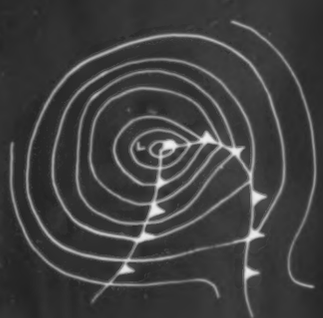
New Business In The Hangar

READING AVIATION'S ELEVENTH NATIONAL MAINTENANCE AND OPERATIONS MEETING at Reading, Pa., June 3-4 has attracted so much interest additional exhibit space has been made available to the industry. Sime Bertolet, president of Reading Aviation Service, said he expects largest attendance and participation ever for the event, which features judging and awards for outstanding business aircraft.

NATIONAL BUSINESS AIRCRAFT ASSOCIATION'S 13th annual meeting and forum will be held in Los Angeles Sept. 20-22 with Lockheed Air Terminal at Burbank as the site for the meeting's static display and fly-by of business aircraft. About 40 aircraft and helicopters will take part. NBAA forum headquarters will be the Ambassador Hotel in LA, with LA International Airport, Lockheed Air Terminal, Van Nuys Municipal and Santa Monica Municipal as host airports with Ontario and Long Beach as alternates. Scott Miller of AiResearch Aviation Service is general chairman of the local organizing committee for the meeting. Raymond (Mickey) Parr of the Garrett Corp. (AiResearch) news bureau is handling news releases for the local group.

REMMERT-WERNER, Inc., Lambert Field, St. Louis, has delivered a new executive DC-3 conversion to A. E. Staley Manufacturing Co., Decatur, Ill., Lou Rinebold and Chet Weslock, pilots. In addition to office and passenger equipment in cabin, it features Bendix RDR radar, Sperry C4 Gyrosyn compass, Collins 17L6-51X communications, ARC-210 standby, dual Collins 51R3 omni with dual Collins 51V glideslope receivers, Collins Integrated Flight System and dual radio magnetic indicators, dual Bendix ADF with iron core loops, Collins 51Z marker, isolation amplifiers with dual cockpit speakers, custom radio and instrument panels, Janitrol heater, lightweight landing gear doors, short exhaust stacks, aileron gap strips and other equip-

positive protection against carburetor icing



Carburetor ice—a condition that every pilot knows—and dreads—since ice may cause a sudden fuel shut-off and power loss.

But now, owners of aircraft with R1820 engines (Lodestar, Learstar, DC-3, Super DC-3) or R2800 engines (Convair 340, 440) need worry no longer about carburetor ice. This problem is solved by PacAero's Alternate Fuel Metering System, 100% successful in every installation, fully FAA certificated.

The Alternate Fuel Metering System offers positive protection against boost venturi and impact tube icing, by allowing unmetered fuel pressure to open the ice-locked poppet valve, thus providing instantaneous emergency engine power.

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MARTIN 404 EXECUTIVE CONVERSION, performed by Spartan Aircraft at Tulsa for Max Houston, lumberman of Wichita, Kansas, has three cabin compartments — one as an office, one for passengers and one for sleeping. Cabin seats 15 and sleeps six. Martha Stone Interiors worked with Spartan on the project. Cruising speed is 280 mph., according to Spartan.

ment. . . . A new Convair executive conversion has been delivered to Fairbanks-Whitney, Jack Jones, pilot. It is equipped with Bendix RDR radar, Sperry A12 autopilot, engine analyzer, dual Collins 51R omni with RMI, dual ADF, ARC-210 transceiver, MHF transceiver, isolation amplifier, custom instrument and radio panels and deluxe executive interior. . . . Alternate fuel system and flowmeters were installed in Stan Hoag's Carrier Corporation Lodestar. . . . Jack Chastain's Petrolite E18 Beech was in for new exterior paint. . . . Also in the hangar for work were Charles Schenk's Wyandotte Chemical DC-3 and the Kingsford Company's Twin-Bonanza.

HOWARD AERO SERVICE DIVISION, San Antonio, delivered Dick Bushbaum's S. J. Groves D18 Beech with airstair door, wraparound windshield, new interior and new paint. . . . Earl Harding's Pontiac Refining Convair 240 was in for CD-2, engine

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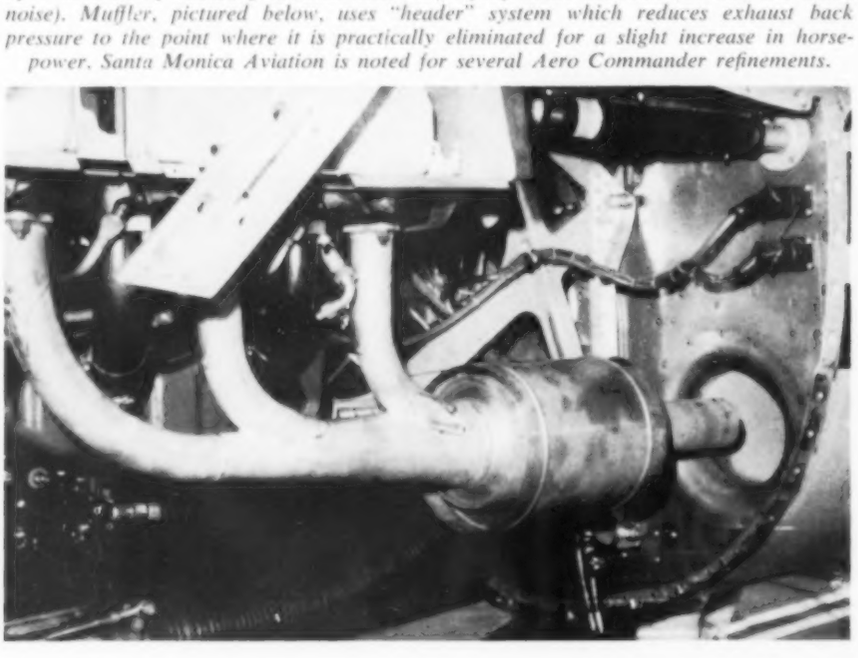
analyzer installation and 100-hr. inspection. . . . Sierracote electrically-headed windshield was installed in Lou Nelson's Murphy Corp. Lodestar. . . . Don Bond had two Celanese Howard 250 Lodestars in, one for wet wing installation. . . . Bud Clark's National Distillers' Grumman Gulfstream was in for new interior and paint. . . . Deseal and reseal of center-section fuel tanks were performed on Jay Bibbert's Oman Construction Lodestar. . . . Bill Powell brought in Russell A. Firestone, Jr.'s B-26 for modifications. . . . In for maintenance were Larry Montigny's Ada Oil PV-1, Fred Acres' Texas Gulf Sulphur Lodestar, Max Espinosa's E. W. Pauley Beech 18, Henry Messer's Milner Enterprises Mark II Super, Leonard Smith's Western Pipe Line Lodestar, Bill Johnson's John Deere DC-3 and Victor Adding Machines' Super 18 Beech. . . . Dick Gabler's R. W. Briggs Company Beech 18 received new interior and re-wiring.

PACAERO ENGINEERING CORP., Santa Monica, delivered U. S. Steel's first Grumman Gulfstream after installing custom interior and electronics. . . . General Motors Air Transport Section sent in their third Convair 440 for conversion to Allison turboprops and installation of additional fuel supply and custom interior. . . . Bill Correll's Pan Atlantic Steamship Learstar was in for a new windshield. . . . Jess Mosher picked up his Kaiser Services DC-3 with gross weight modification, Sierracote windshield and interior work. . . . Joe Betty brought in Upjohn's Grumman Gulfstream for exterior paint. . . . Convair 440's were brought in by Ford Motor and Union Oil for conversion to Allison turboprops. . . . Also in were A. C. Korb's Westinghouse Electric Learstar and Frank Thera's Minnesota Mining's Learstar.

EXECUTIVE AIRCRAFT SERVICE, Redbird Airport, Dallas, had V. Irwin's Gulf Oil 440 Convair N98G in for new exterior paint, exhaust muffler overhaul and other work. . . . Russell Purchase's Dow Chemical DC-3 was in for windshield replacement and landing gear inspection. . . . The LeTourneau-Westinghouse B-23 was brought in by E. A. Valdes for Janitrol heater modification. . . . Also in were R. F. (Wimpy) Neel's E. W. Brown, Jr. DC-3, E. P. (Cotton) Jeter's Union Producing Lodestar, Jim McCoy's Union Producing Grumman Mallard, and Ernie McGill's Bankers Life DC-3.

AIRESEARCH AVIATION SERVICE, Los Angeles International Airport, received a third Fairchild F-27 for custom interior. . . . An oil company Grumman Gulfstream returned for further interior modification. . . . Charlie Bing brought in the J. J. Ryan Grumman Mallard from Virginia for relicensing. . . . RCA AVQ-10 radar and air-conditioning modification were installed in the Garrett Corporation's Convair 240. . . . **EUPHORIAN AIRCRAFT SEATS,** scientifically contoured to support the body (Euphorian in Greek means "complete relaxation"), have been placed into production by Universal Equipment Corp., represented in sales by Airsupply-Aero Engineering Co. of Beverly Hills, a division of the Garrett Corp. The new deluxe executive version of the

MUFFLER SYSTEM FOR MODEL 500 AERO COMMANDER has been FAA-certificated by Santa Monica Aviation, Santa Monica, Calif., which is marketing kits at $979. Jack Baumann, general manager, says the muffler system reduced cabin noise by 7 decibels by reducing exhaust noise 70% (prop noise accounts for half the cabin noise). Muffler, pictured below, uses "header" system which reduces exhaust back pressure to the point where it is practically eliminated for a slight increase in horsepower. Santa Monica Aviation is noted for several Aero Commander refinements.



seat, including swivel base and automatic leg rest, weighs only 36 lbs., is FAA-certified for 9G.

DALLAS AERO SERVICE, Love Field, Dallas, had Ernie Blagg's C. F. Curry Lodestar and Bill Jessup's Rodman Supply Lodestar for engine changes and performed miscellaneous work on Gabe Luden's Central Soya Lodestar.

FREDERICK B. AYER & ASSOCIATES, New York City, has sold an executive DC-6B Ayer-Liner to Reynolds Metals, which will use it for company transportation to offices in Latin America, Europe and the far and Middle East.

THE BABB COMPANY is having Babb-owned Lockheed 749A convertible cargo Constellations modified at a rate of three planes a month and is marketing the Connies at $350,000 each. Conversion is being performed by the firm's affiliate, Flight Enterprises, Bradley Field, Hartford, Conn. The 749A, with 116-by-74-in. cargo-passenger door and stressed cargo floor, will carry 13 tons of cargo 2,000 miles or seat 83 passengers, has pressurized and air-conditioned cabin and is powered by zero-time BD-1 engines.

PACIFIC AIRMOTIVE, Burbank, has elected Robert L. Earle executive vice president.

FLITE-TRONICS, INC., Burbank, has a new transistorized CA-3C speaker amplifier designed to deliver 7.5-watt output to overcome cockpit noise under severest conditions.

NEW MASON CONTOUR CHAIR FOR AIR TRANSPORTS, featuring new comfort and universal interchangeability so that seats from a Boeing 707 or DC-8 can also be easily locked in a Beech Bonanza, will be produced by Teco, Inc., Burbank. E. Gilbert Mason, inventor of the seat, is a former Douglas Aircraft interior seating consultant who designed cabin interiors for the DC-6, presidential transports, Boeing 707's and Lockheed Electras. He and J. Ross Clarke II have purchased Teco.

AERO CORP. OF ATLANTA, Municipal Airport, Atlanta, has promoted Bill Coley, former chief engineer, to assistant to the president, and Bob Dutton, former production supervisor, to manager of production, according to Tom Lombardo, president. Both have been with Aero since January, 1956.

Bob Dutton Bill Coley

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NEW AERO COMMANDERS

(Continued from page 23)

500A, 1,300-1,155 ft. for the 500B, 1,070-1,210 ft. for the 560F and 1,380 and 1,330 ft. for the 680F.

Stall speeds at gross weight are 61 mph. for the 500A, 63 mph. for the 500B, 66 mph. for the 560F and 71 mph. for the 8,000-lb. 680F.

Minimum single-engine control speed for the 6,000-lb. 500A is 70 mph. — lowest of any light twin, as is its 61-mph. stall speed. Minimum single-engine control speeds were not given for the other three models.

"Improved lift-over-drag factors achieved with our new airfoil nacelles made it possible for us to lower stall speeds and to lower minimum single-engine control speeds appreciably," Ted Smith said. "We have concentrated on making our twins safer and easier to fly while at the same time making them faster."

Commenting further on the first of the new models to be flight tested, Smith said the 500A at gross weight and on one engine will climb to 10,000 ft. and will cruise on one engine at 163 mph. at 5,000 ft. using 75% hp. on the good engine. He gave its cruise performance in several power conditions as follows: 220 mph. on 70% hp. at 10,000 ft., 208 mph. on 60% hp. at 10,000 ft., 190 mph. on 55% hp. at 10,000 ft., 181 mph. on 45% hp. at 10,000 ft., and 131 mph. IAS on 32% hp. at 5,000 ft. Its 156-gal. standard fuel capacity gives it a range of 1,420 miles with 30-min. reserve using 45% hp. for 181 mph. true airspeed at 10,000 ft. — this is a flight endurance of 8 hrs. or so while truing 181 mph.

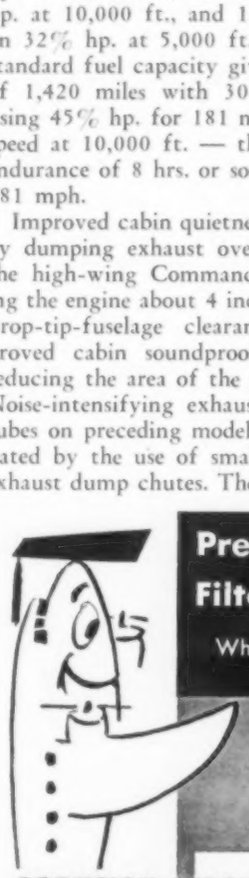
Improved cabin quietness is achieved by dumping exhaust over the top of the high-wing Commanders, by raising the engine about 4 inches for more prop-tip-fuselage clearance, by improved cabin soundproofing and by reducing the area of the rear window. Noise-intensifying exhaust augmentor tubes on preceding models were eliminated by the use of small nacelle-top exhaust dump chutes. These chutes are equipped with electric cooling flaps.

In going to thinner nacelles, visibility from the cabin was increased for all passengers. The new nacelle has 9 inches less depth beneath the wing. Frontal area of the new nacelle is 40% less than that of the older nacelle, achieving a drag reduction of 10 per cent. The new nacelle's panels are of double-wall construction and new quick-type fasteners are used to facilitate easy opening for engine servicing. A single scoop replaces the old-type nacelle's dual induction air system.

All of the new models have new 3-section instrument panels and new control quadrants. Each of the instrument panel sections is hinged at the bottom for easy instrument servicing access. Dual flight groups are in the side sections, engine group is at center with a radio panel across the top but beneath the glare-shield. Pilot and co-pilot have individual light and ventilation outlets at their seats, as do all passengers, with each outlet having its own light switch. Cabin air is exhausted through a continuous concealed opening in a duct along both sidewalls, eliminating the noise of a single air exhaust which was formerly at the rear of the cabin. New ash trays are larger and fitted flush into the sidewalls, rotating out for use.

An added new touch is a lighted fasten-seat-belt-no-smoking sign flush-mounted in the headliner just behind the cockpit curtain, which is standard equipment. The sign is lighted automatically for take-off and landing. The aft cabin bulkhead, behind the rear seats, is now solid for more structural strength and more effective isolation of engine noise.

Many changes to new equipment items have been made and no surplus equipment is used. New and standard equipment includes 50-amp generators on the 500A and 500B and 100-amp generators on the 560F and 680F. New wiring systems are used throughout and the hydraulic system has a new electric pump and emergency brake system. Extensive other equipment is



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New Dare Nav-Com

A new Dare nav-com system is featured in Aero Design's new Model 500A Aero Commander demonstrator. In the 105.1-lb. package are a 360-channel DTR-360B communications transceiver with 50-kc. spacing, 20-watt transmitter and 2 control heads with new horizontal digital read-out and with cross-switching and instant use of preselected frequencies and any combination of cross-channel operation; dual 560-channel DTR-560 omni-navigation system with automatic glideslope switching; a DADF-1 ADF, DGS-20 glideslope receiver, DM-3 3-light marker and DAS-1 speaker-amplifier.

standard in all of the new models.

Empty weights were increased in all of the new models. So were gross weights, except in the 500A. The 680F's gross was upped 500 lbs. to 8,000 lbs., which is the heaviest of any light twin, and its empty weight was upped 325 lbs. for a net gain in useful load of 175 lbs. This raised the 680F's useful load to 3,200 lbs., highest of any light twin. The 560F's gross was upped 500 lbs. along with an empty weight increase of 270 lbs. for a net gain of 230 lbs. and a new useful load of 2,430 lbs. The 500B is new to the line. In the 500A, gross weight remained at 6,000 lbs. but empty weight was upped 225 lbs. for the same reduction in its useful load, this being 1,925 lbs.

Compared to the models they replace, the new models carry increased prices reflecting the many changes in equipment, including new and more powerful engines. The 680F is up $19,000 in price, the 560F is up $20,100 and the 500A is $7,250 higher than the preceding Model 500.

The extensive change-over is estimated by George Pew, president of Aero Design, to have cost the company approximately $2,000,000. In addition to research, development, engineering and testing expenses, the investment includes new tooling.

"We are investing in new standards of aircraft usefulness, safety, performance, efficiency and comfort for our customers, and these new standards will not only strengthen and broaden our market but advance our company's capabilities in perfecting even better aircraft in the future," Pew said.

An increase of 35% in 12-month sales of the 1960 models is expected by Tom Harris, vice president in charge of sales. Harris said the growing demand for high-performance light twins is also expected to continue for several years in the forseeable future. "Expanding American industry needs the advantages offered by modern aircraft of improved standards," Harris said. "Our studies show that a progressive corporation which doubles in size requires a five-fold increase in aircraft transportation for its personnel."

Distributors at the sales meeting ordered 60 of the new models, fifteen of each, and their orders added up to almost $6,000,000 in retail value. Because the start-up of production forced allocation of delivery positions, the company conducted an "auction" for the positions. Make-believe money was issued to distributors equivalent to their 1959 dollar purchases, and this was used in bidding on the future delivery positions.

Delivery schedules start in May for the 500A, June for the 500B, August for the 560F and late July for the 680F. Meanwhile, a factory demonstrator 500A began an intensive nationwide tour during April.

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1957 Model D-50 Twin Bonanza: Total time 603 hours. Left engine 0-hours remanufactured engine. Right engine 603 hours. Bendix TA20/RA18 transceiver, ARC 21 ADF, ARC CD-1 course director. Air conditioner, prop anti-icers, Federal autopilot. Dark green, white top. Brown tweed, yellow leather interior. **Price: $59,000.**

1955 Model E-18S Twin Beechcraft: Low time, high quality engines. 1760 total airframe hours. ARC 210 transceiver, ARC 21 ADF, Gyrosyn compass, boots, prop anti-icers, almost all other optional features. New 1959 paint design, light blue, dark blue stripe, white top. Interior spotless, blue color scheme. **Price: $82,500.**

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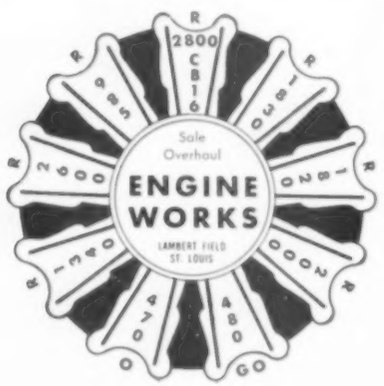

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